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EXPERIMENTAL INTESTINAL OBSTRUCTION

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MANY theories have been advanced in attempts to give an explanation for the symptoms and death which follow acute obstruction of the bowel. The chance discovery of Stone, Bernheim and Whipple[1] that death followed the closure of both ends of an isolated segment of the bowel, even though the continuity of the intestine was re-established by an anastomosis of the sections above and below the resected loop, gave a fresh impetus to the experimental study of intestinal obstruction. This observation showed clearly that the mechanical barrier to the passage of food along the digestive tube when the bowel was obstructed in its continuity was not a primary factor in the production of the symptoms, nor could loss of the absorptive area of that portion of the bowel below the obstructed point be responsible.

Within the past ten years or so an enormous amount of experimental work has been undertaken in efforts to solve the problem of acute obstruction, and it is impossible to make even a limited survey of the literature here. It will perhaps be of advantage however, if, in order that the aim of the experiments reported in this paper be clearer to the reader, a summary be made of the two main theories which may be said to have impelled the greater part of the researches into this baffling problem.

Many workers have supported a bacterial theory in one or other of its modifications. The toxin of the Welch bacillus has been suspected by some[2] to be the cause of the symptoms, though recent work gives little or no confirmation of this suspicion. Others have considered that a bacterial toxin itself was not responsible, but that a product of the bacterial decomposition of protein material within the intestinal lumen was the causative agent. Histamine was mentioned in this connection, and though this amine was on trial for years, its guilt has not been established. Indeed, the charge seems to have been a trumped-up one, unsupported by any serious evidence.

It is difficult to see how intestinal obstruction can be of bacterial origin. The symptoms diminish in intensity and the survival time is lengthened the lower in the intestinal tract that the obstruction is produced. Bacterial growth, protein decomposition and histamine concentration, on the other hand, all are greater in the lower than in the higher reaches of the intestinal tract. No theory of obstruction can be accepted which ignores the fact that the severity of the symptoms is directly related to the height at which the obstruction is made.

At the present time the dechlorination and dehydration theory is in the greatest favour. It was first pointed out by Hartwell and Hoguet[3] that obstructed animals which survived for some days showed marked dehydration. Vomiting, it was claimed, was responsible for the disturbance in the body's water balance, and the symptoms of obstruction and death were believed to be the direct sequence of this. Haden and Orr[4] were able to prolong the lives of their animals by the administration of sodium chloride intravenously. Unable to account for the loss of chloride by vomiting, these observers advanced the theory, which has not been substantiated, that chloride passed into the tissues to neutralize a hypothetical toxic substance.

The following quotations from the recent literature will serve to illustrate the division of

opinion regarding the cause of death in acute intestinal obstruction.

"The presence of bacteria in the lumen of an obstructed bowel is necessary for the production of lethal substances that produce toxæmia in acute intestinal obstruction. This bacterial origin of the toxin in the contents of the obstructed bowel is being universally accepted . . . . The exact nature of the toxins formed in the obstructed bowel is not known." (Thurston,[5] 1931).

"It is now generally accepted by investigators of the subject of intestinal obstruction that the cause of death in the high simple variety is due to the loss of gastro-intestinal secretions by vomiting . . . This results in a great upset of water and salt metabolism so that chemical analysis of the plasma shows marked changes, chiefly consisting of a lowering of plasma chlorides and increase in CO_2 combining power of the blood." (Miller[6] 1931).

EXPERIMENTAL

Experiments with sterile loops.—If the formation of a toxin by the action of bacteria upon the intestinal contents is the cause of death following the obstruction of closed loops, it might be expected that a sterile loop could be closed with impunity. We therefore in a series of animals isolated a loop in the usual way and closed one end. The other end of the loop was brought out through the abdominal wall, and having been stitched into position was allowed to drain for several months. In the first animal treated in this way the loop was allowed to drain for 8 months. At the end of this time the abdomen was opened and a small incision made in the loop near its closed end. A swab was inserted and a specimen of the contents of the loop taken and both broth and deep glucose agar cultures were made and incubated for 48 hours. There was no growth at the end of this time. Ten days later the abdomen was re-opened and that portion of bowel passing through the abdominal wall was resected. Its end was closed by a purse-string suture and then inverted. This animal died within 60 hours with the usual signs of obstruction. In the second animal the loop was allowed to drain for 6 months. A culture at the end of this time showed that the contents of the loop were sterile. Closure of the fistulous opening caused death, with the usual signs of obstruction, within 36 hours. Later it was found unnecessary to allow so long a time for drainage. The loops in subsequent experiments gave sterile cultures after they had drained for two or three months. In these, as in the first animals, death occurred in from two to four days after the loop had been closed. Even had the contents of the lumina or the walls of the loops contained bacteria which the culture had failed to reveal, the symptoms, in our opinion, appear much too suddenly to admit of their bacterial origin.

In another animal the loop after draining to the exterior for several months was dropped into the abdominal cavity without closure. No ill effects resulted, though a week was allowed for its contents, if infective, to soil the peritoneal cavity. At the end of this time the abdomen was re-opened and the end closed in the usual way. Death occurred within 30 hours.

Two animals of this series did not succumb. They showed the usual signs for a couple of days after the closure of the loop, but then recovered and remained in good health until killed. Post-mortem examination showed the loop to be filled with a pasty putrid mass, swarming with bacteria. It may justly be asked then, why, if bacteria are in any way the cause of death, had these animals survived, whereas the others, in which the loops were relatively sterile when closed, developed the acute symp-

TABLE I.

EXPERIMENTS WITH DRAINING LOOPS

No.	*Date of Drainage Operation*	*Culture*	*Time of Closure of Loop*	*Results*
14	5/10/30	Negative	7½ months	Prostration 1st day. Killed 3rd day. Usual signs of obstruction.
15	15/2/31	Negative	6 months. Dropped open into abdomen and left for 1 week before closure	Died 2nd day. Typical P.M. signs of obstruction.
33	10/8/31	Negative	2½ months	Died in 3 days.
58	20/8/31	Negative	3 months	Died in 3 days.
48	15/3/31	Positive	2½ months	Ill; recovered. Loop filled with putrid material. Rich bacterial growth.
59	20/10/31	Positive	1 month	Ill; recovered. Loop filled with putrid material. Rich bacterial growth.
56	15/11/31	Positive	6 months	Died in 8 days. Peritonitis.

Table I shows the results of closing an isolated segment of the bowel which has drained to the exterior for several weeks.

toms and died (see Table I). These experiments, though affording no support for the bacterial theory of intestinal obstruction, and indeed suggesting very forcibly that bacteria are not at all concerned in the production of the symptoms, nevertheless fall short of providing a conclusive answer to the question. A fresh point of vantage was gained through the next series of experiments.

Experiments with a balloon: distension without obstruction.—In some of our earliest experiments with closed loops we filled the isolated segment of bowel with bismuth and observed it under the fluorescent screen. We were struck by the great peristaltic activity displayed. Peristaltic waves commencing at the proximal end could be seen to sweep downwards toward the distal end which became ballooned out by the trapped fluid material. In animals which were given large doses of atropine the motility of the loop was less active. There seemed to be a definite relationship between the activity of the loop and the condition of the animal, in that the symptoms were less severe in these animals and the survival time was longer than in those which had not been atropinized.

These observations suggested to us the importance of peristalsis and distension of the bowel wall as factors in the symptoms of obstruction. Others have remarked upon distension as being an essential feature, but the manner in which it produced death has been variously interpreted.[7, 8, 9] According to some it caused toxins formed in the intestinal lumen to be more rapidly absorbed. According to others it acted by injuring the blood supply to the loop. Neither of these explanations, for various reasons, carried conviction. It is well known that distension is the adequate stimulus for peristalsis and for secretion as well. Pain and probably other afferent fibres are also stimulated by distension of the bowel. If distension is the primary cause of the sequence of events seen in obstruction, then distension alone should produce the same results as an actual mechanical obstruction. In order to investigate this question the following type of experiment was performed.

A rubber tube about ½ inch in diameter, fastened to a sausage-shaped balloon, was placed in the bowel, the continuity of which was not otherwise interfered with. The balloon was inflated until it caused a moderate distension of the bowel wall—60 to 110 mm. Hg. (Fig. 1). Most of the animals in which the pressure employed was around 100 mm. Hg. died within 24 hours with the usual symptoms and post-mortem findings of acute obstruction. The longest survival time was 54 hours. A very close relationship between the degree of distension and the severity of the symptoms was observed. In our earlier experiments the balloon was inflated by the operator's breath. In these

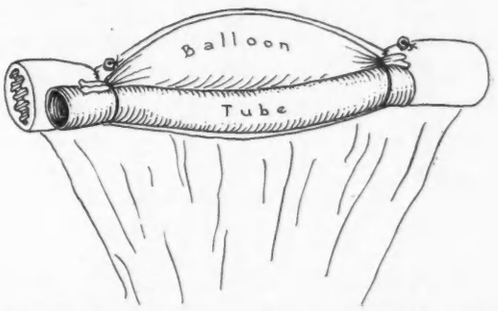

FIG. 1.—Showing balloon distended within the bowel and attached to rubber tube. Two small brass nuts are shown stitched to the bowel wall, one above and the other below the distended region. These enabled the position of the balloon, which also cast a shadow, to be determined by x-ray examination.

the animals were ill for two or three days, passed the balloon, and then quickly recovered (Table II). The contrast between the condition of the animal while the balloon was in place and after it was dislodged was usually most striking.

TABLE II.

DISTENSION WITHOUT OBSTRUCTION

No.	*Air pressure*	*Survival time*	*Remarks*
62	Breath	6 days	Very ill first day. P.M. typical. Balloon in place. No blockage.
63	Breath	Recovered	Prostrated and very ill 3 days. Balloon passed.
64	Breath	(1) Recovered	Prostrated 1st day. Passed balloon.
	Breath	(2) Recovered	Ill 2 days. Passed balloon.
	Breath	(3) Recovered	Ill 3 days. Distension not sufficient.
	Pump 100 mm. Hg.	(4) 24 hours	Typical P.M. findings.
67	Breath	(1) Recovered	Very ill 2 days. Improved but ill for 9 days. Operation. Balloon in place but had leaked.
	Pump 80-100 mm. Hg.	(2) 20 hours	Typical P.M.

Table II shows that distension of the bowel wall in the absence of a mechanical obstruction causes death when a sufficient degree of inflation is employed.

When the distending pressure was created by means of a small hand pump and the balloon did not become displaced, rapid death was the invariable result (Table III).

TABLE III
DISTENSION WITHOUT OBSTRUCTION

No.	*Air pump pressure*	*Survival time*	*Remarks*
64	100 mm. Hg.	24 hours	Typical P.M.
67	80-100 "	20 "	" "
70	80-100 "	24 "	" "
71	70 "	38 "	" "
80	100 "	24 "	" "
81	100 "	21 "	" "
83	100 "	21 "	" "
93	100 "	54 "	" "
94	110 "	42 "	" "
		Average survival time 29 hours	

Table III shows that the inflation of a balloon within the bowel to a pressure of about 100 mm. Hg. causes rapid death. The rubber tube to which the balloon was attached was shown by x-ray examination to conduct material freely past the distended region.

That there was in fact no obstruction of the bowel lumen in these experiments was proved by x-rays; a barium mixture passed freely through the tube into that portion of the bowel below the distended region. In no case did the pressure cause any apparent interference with the blood supply of the loop. The pressure as recorded at the time of the operation was probably very considerably greater than that which existed half an hour later, since the bowel invariably relaxes to accommodate itself to the balloon. The fact that the balloon is passed along the bowel so readily in many cases, and this is the chief difficulty with which we have had to contend in these experiments, indicates that a damaging pressure has not been employed. In several instances peristaltic waves could be observed by x-rays to pass over the proximal part of the distended segment, which fact affords further evidence of its viability.

These experiments, we believe, dispose of the theories that a bacterial toxin or a toxic substance derived from bacterial action is concerned in the symptoms of intestinal obstruction. Since free drainage of the bowel above the point of distension is afforded by the presence of the rubber tubing, no unusual opportunity is provided for by the growth of bacteria, the formation of proteolytic products or the absorption of toxic substances. Nor does it seem that chloride loss and dehydration are important factors, since most of these animals lose little or no fluid, and death occurs so rapidly.

While these experiments were in progress a paper appeared by Herrin and Meek[9] in which somewhat similar experiments were reported. They formed Thiry fistulæ and distended the fistulous loops to a pressure of about 80 mm. of mercury. Animals treated in this way lived for from 8 to 14 days. Death was ascribed to the loss of chloride in the secretions of the loop, which were allowed to drain to the exterior. These observers consider that the condition which they established is analogous to intestinal obstruction, since in both a fall in chloride is a characteristic feature. We question, however, whether a condition which does not cause death for from 8 to 14 days, and in which chloride is being drained continuously from the body, can be considered to have a direct bearing upon the causation of the acute symptoms which follow obstruction of the bowel in its continuity or the closure of both ends of an isolated segment. Their experiments do show that distension of the bowel wall stimulates secretion, and that the chloride loss which results is a factor which shortens the survival time of their animals. Our experiments, however, indicate that the loss of chloride is not a factor in the causation of the severe symptoms and rapid death which follow acute obstruction. Even in those less acute types in which death does not occur for several days, dechlorination appears to be a contributory rather than a primary cause of the symptoms and death.

As already mentioned, the animals in our experiments did not lose a sufficient quantity of fluid by vomiting to lead us to suppose that chloride loss or dehydration could be a factor. After death neither the stomach nor the intestinal tract was found to contain an abnormal quantity of fluid. Herrin and Meek also remark that their animals did not lose much fluid by vomiting, and that if the distended loop instead of being allowed to drain to the exterior was made to drain into the ileum death did not result, since presumably the secreted chloride was re-absorbed. It is clear then that our experiments in which any secreted chloride would also be re-absorbed, yet the animals die quickly, are more closely comparable to acute intestinal obstruction than those of Herrin and Meek in which chloride was lost to the body through the draining loop. At any rate it appears that in

the experiments reported below some lethal factor other than chloride loss is concerned.

That the loss of fluid through vomiting may cause a profound fall in the blood chlorides is an established fact. Hastings, Murray and Murray[10] found that obstruction of the pylorus in dogs caused a striking reduction in the blood chloride, which fell to 50 per cent of the normal within a few days after operation. Gamble and Ross[11] confirmed this observation and made a more extended study of the changes in blood chemistry which follow pyloric occlusion. They take as a premise that "a withdrawal of the electrolytes of the body fluids will be accompanied by a proportionate reduction of the volume of body water and that this change can only be repaired by replacing both the lost water and the lost electrolytes." They show that the loss of chloride in the vomitus is repaired for a time by the retention of carbon dioxide and an increase in bicarbonate. By this means the concentration of the electrolytes is maintained. In other words, the sum of (Cl′) and (HCO_3') remains constant up to 30 hours or so after the obstruction has been established. A degree of alkalosis, however, results which is countered by

TABLE IV

BLOOD NaCl MGRM. PER 100 C.C.

Dog No.	*Pre-operative*	*Before death*	*Fall in per cent*	*Survival time in hours*
80	464	426	8	24
81	459	449	2	21
83	464	459	1	21
93	466	325	28	54
94	478	435	9	42

Table IV. The blood chlorides determined just before death in 5 of the animals shown in the previous Table.

a loss of base (Na), as judged from a reduction in (Cl′) + (HCO_3'). The reduction in ionic concentration of body fluids resulting from the depletion of base, which unlike Cl′ cannot be substituted for, is accompanied by a proportionate water loss. Values for serum chlorides showing a reduction to 36 per cent of the normal are reported by these observers, who consider the changes in blood chemistry and the consequent dehydration to be the primary cause of death. The value of sodium chloride injections in prolonging life depends upon the fact that sodium is re-supplied to the body. Chlorides such as NH_4Cl or KCl are without any beneficial effect. Nor will water alone or a solution of glucose prolong life.

We have determined the blood chloride in a number of animals after distension of the bowel in the manner described. *No significant fall in chloride occurred in those animals which died within 40 hours with the signs and post-mortem findings of acute obstruction* (Table IV). Animals in which the distension was insufficient to produce acute symptoms and which lived several days did show, however, a pronounced fall in chloride (Table V). The figures shown in Tables IV and V give little indication that the depression of the plasma chloride is the direct cause of death. As a matter of fact the relationship between chloride loss and survival time is more correctly expressed by saying that the longer the animal lives the greater is the fall in its blood chloride.

TABLE V

BLOOD NaCl MGRM. 100 C.C.

Day	*Dog 72*	*Dog 78*	*Dog 79*
Pre-op.	429	435	456
1	383	391	406
2	...	373	364
3	326	373	344
4	Balloon passed	376	308
5		331	302
6		304	Balloon passed
7		340	
8		297	
9		290	
10		256	
		Balloon passed	

Table V. Blood chloride in animals in which balloon has not remained in place, but moving downwards has produced less acute symptoms.

Dragstedt and Ellis[12] depleted the chlorides of dogs over relatively long periods (25 to 51 days) by means of gastric fistulæ. The chloride reduction was prevented from reaching an excessively low level by the administration of Ringer's solution when necessary. Of the three animals employed in these experiments the blood chloride was reduced to 36 per cent of the normal in one and to about 45 per cent of the normal in another. Both animals showed depression but did not succumb. In the third animal the blood sodium chloride was 50 per cent of the normal or lower, from the 20th day. It died on the 25th day "in depression." No chloride determination was made after the 20th day, but the value was probably much higher at this time than on the day of death. The values

for the blood chlorides of the two animals which survived are considerably lower than the great majority of the blood chloride values reported in the literature as found in intestinal obstruction, and in one animal the value is as low as those observed by Gamble and Ross following obstruction of the pylorus. The average values of the blood chlorides of a large number of animals dying in from 2 to 11 days of intestinal obstruction, as reported by Haden and Orr,[13] are 71 per cent of the normal. The values reported by Herrin and Meek are on the average 76 per cent of the normal. The lowest value which we have encountered in the literature is that of an animal reported by Armour, Brown, Dunlop, Mitchell, Searle and Steward[14] in which a blood NaCl of 100 mgrm. per cent was found (about 20 per cent of normal). This extraordinarily low value was given, however, by a determination made just before death. During the preceding week the value had been 200 mgrm. per cent or 40 per cent of normal.

The foregoing facts, when considered together with our own observation that in animals which showed all the symptoms of acute obstruction and died within from 20 to 48 hours there was little or no fall in blood chloride and that practically no fluid was lost by vomiting, engendered doubt in our minds concerning the very serious effects which have been ascribed to chloride loss. We questioned whether it should be held primarily responsible for death in obstruction.

It seems strange that though paramount importance has been attached to chloride loss and dehydration in intestinal obstruction, so far as we are aware no experiments relative to the effect upon normal animals of a degree of chloride depletion comparable with that observed in intestinal obstruction have been reported in the recent literature. Though a reduction in blood chloride is often a feature in obstruction of the bowel it cannot be concluded from this fact that chloride loss is the direct cause of death. Nor can such a conclusion be drawn from the fact that life may be prolonged by saline injections. Other conditions unrelated causally to chloride loss are benefited by saline injections. In order to investigate the lethal power of chloride depletion alone and uncomplicated by possible effects referable to operative interference with the gastrointestinal tract, the following experiments were carried out upon three normal dogs.

Dog No. 92. Hound, 5 kilos. April 4, 1933. Blood NaCl 427 mgrm. per cent. Animal starved. April 5th 2 p.m. given 1/100 g. eserine to promote gastric secretion, followed by 1/40 grain apomorphine to induce vomiting. Procedure repeated at 4 p.m. April 6th 9.10 a.m. given small quantity of meat. 9.30 a.m. 1/40 grain apomorphine given subcutaneously. Animal vomited. 2 p.m. 1 mgrm. histamine given subcutaneously to stimulate gastric secretion. Stomach filled with water through stomach tube. Apomorphine 1/40 grain given immediately afterwards. Animal vomited. The foregoing procedures (histamine injection, water by stomach tube and apomorphine injections) were repeated four times during the afternoon. April 7th and 8th animal given the same treatment as on April 6th. Blood NoCl 282 mgrm. per cent. Animal appears quite well.

Dog No. 95. 12 kilos. The blood chlorides of this animal were reduced by the same means as those employed with dog 92. The treatment, however, was much more drastic, the histamine injections and stomach washings being repeated from 5 to 7 times per day. The experiment was also continued for a much longer time—26 days, from April 18th to May 12th. The animal's normal blood NaCl was 478 mgrm. per cent. It declined steadily as a result of the treatment and by the fourth day had reached the very low value of 184 mgrm. per cent. It was maintained at between 40 per cent and 50 per cent of the normal during the remainder of the time. The animal to all appearances was perfectly normal throughout the course of the experiment. After the first week it received a small quantity of meat daily. Fig. 2 shows a photograph taken toward the end of the experiment. The complete series of the blood chloride determinations made upon this animal are shown in Table VI. See also Fig. 3. On the last day of the experiment a sample of blood was taken for the determination of its CO_2 combining power. This was found to be 78.0 volumes per cent. A sample of muscle taken at the same time showed a water content within normal limits (75 per cent). No increased excitability of the muscles was noted at any time.

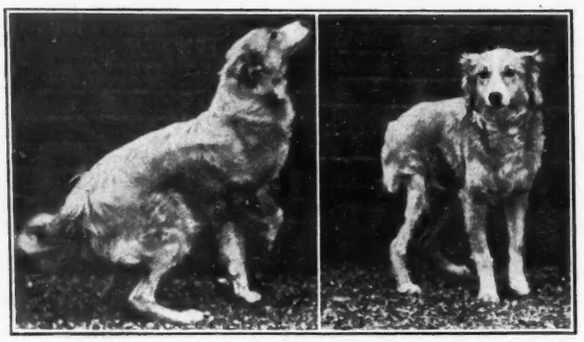

FIG. 2.—Photograph of Dog No. 95 taken just before the conclusion of an experiment in which its blood chlorides were maintained at a very low level for over three weeks.

Dog No. 97. Terrier, 7.5 kilos. June 2nd blood NaCl 430 mgrm. per 100 c.c. Blood NPN. 35.3 mgrm. per 100 c.c. CO_2 combining power 38.4 vols. per cent. Animal given no food. 2 p.m. 1 mgrm. histamine. 2.30 p.m. stomach filled with water by stomach tube. 1/20 grain apomorphine given subcutaneously immediately afterwards. Copious vomit 4 minutes later. These procedures were repeated once during the afternoon. June 3rd blood NaCl 398 mgrm. per cent. NPN. 46.1 mgrm. Usual procedures for depletion of chlorides carried out

once. June 4th, one treatment given this day. June 5th blood chloride 300 mgrm. per cent. Blood NPN. 46.1. CO_2 combining power 63.5 vols. per cent. Usual procedures carried out at 9.30 a.m., 12.00 noon and 2.00 p.m. June 6th blood chlorides 285 mgrm. per cent. NPN. 37.5, CO_2 combining power 61.2 vols. per cent. Procedures for reduction of chlorides carried out 4 times. June 7th blood chlorides 239 mgrm. per cent. NPN. 37.5, CO_2 combining power 58.6 vols. per cent. Animal given four treatments. June 8th blood chlorides 180 mgrm. per cent. NPN. 69.0. CO_2 combining power 56.5 vols. per cent. Three treatments given. Animal which had been starving since the commencement of the experiment was given 100 grams of lean meat. June 9th blood chlorides 162 mgrm. per cent. NPN. 60.0. CO_2 combining power 56 vols. per cent. Regular treatments were discontinued from this day and animal was given 100 to 150 grams of lean meat daily. Animal appears quite well. Any day upon which the blood chloride showed a tendency to rise one or two treatments were given. The daily determinations of the blood chlorides are shown in Fig. 3. The vomitus of this animal was collected daily and chloride content determined. It has been calculated that some 5 grams of sodium chloride had been lost from the body.

TABLE VI

SHOWING SERIES OF BLOOD CHLORIDES ON DOG 95

REDUCTION IN BLOOD CHLORIDES INDUCED BY HISTAMINE INJECTIONS, GASTRIC LAVAGE AND AN EMETIC

Day	*Times at which procedures for depletion of chlorides were undertaken*	*Blood chloride (NaCl)*		*Remarks*
		Time	*mgrm. per 100 c.c.*	
1	12.00 noon 2.20 p.m. 3.40 p.m. 4.40 p.m.	11.30 a.m. 5.00 p.m.	478 435	Starving during first week.
2	10.30 a.m. 11.40 a.m. 2.15 p.m. 3.00 p.m. 4.00 p.m. 5.15 p.m. 9.15 p.m.	11.30 a.m. 4.10 p.m.	417 338	
3	11.10 a.m. 12.15 p.m. 2.00 p.m. 3.30 p.m. 4.30 p.m. 5.30 p.m. 11.00 p.m.	10.40 a.m. 4.00 p.m. 11.00 p.m.	321 265 241	
4	11.45 a.m. 2.30 p.m. 4.30 p.m. 6.30 p.m.	11.00 a.m. 2.00 p.m.	207 200	Animal bright and to all appearances perfectly normal.
5	11.00 a.m.	11.10 a.m.	184	Though the animal appeared well some fear was felt that the chloride depletion had reached a dangerously low level. A small quantity of sodium chloride was therefore given on this day.
6		10.00 a.m.	245	
7		10.00 a.m.	257	100-150 grm. of lean meat given daily after the first week.
8		10.00 a.m.	270	
9	11.00 a.m. 2.00 p.m.	10.00 a.m.	255	
10	11.00 a.m.	10.00 a.m.	245	
11	11.00 a.m.	10.00 a.m.	240	
14	11.00 a.m.	10.00 a.m.	233	
15		10.00 a.m.	245	
16		10.00 a.m.	225	
18		10.00 a.m.	230	
20		10.00 a.m.	225	
22		10.00 a.m.	240	
23		10.00 a.m.	265	
25		10.00 a.m.	204	Animal bright and normal in appearance. Experiment discontinued.

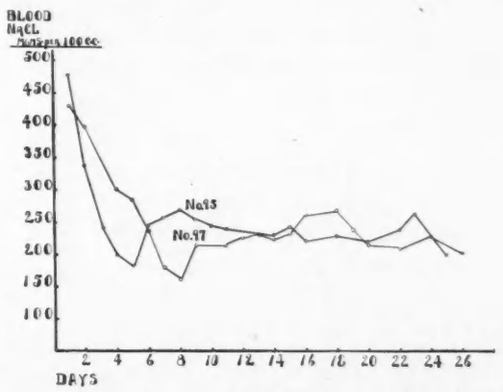

FIG. 3.—Showing the depletion of the blood chlorides of Dogs Nos. 95 and 97 resulting from a course of treatment of histamine injections, gastric lavage and apomorphine. Neither animal showed any ill effects throughout the course of the experiments.

The foregoing experiments in which the blood chlorides were maintained at low levels for many days without serious effects resulting, must throw great doubt upon the primary importance of chloride loss as a cause of death in obstruction.

Distension of the bowel after denervation.—For some time we have had in mind the possibility that the symptoms of acute intestinal obstruction had a nervous basis. The richer nerve supply and greater peristaltic activity of the upper as compared with the lower regions of the intestine offered a possible explanation of the greater susceptibility of animals to high than to low obstructions. The relatively mild effects following obstruction of the colon, which possesses a different motor supply from that of the small bowel, also directed attention to the possibility that the effects of obstruction were neurogenic. The following series of experiments were undertaken to investigate this possibility.

A portion of the bowel from 8 to 10 inches long, its lower limit lying a little below the ligament of Treitz and its upper end just below the pancreatic and bile ducts, was denervated. The thin tissue of the mesentery was completely severed along the entire length of the segment.

The arteries and veins were stripped down to what appeared to be their muscular coats. Incisions encircling the bowel were made at the upper and lower limits of the segment (Fig. 4). The device, consisting of a balloon and rubber tube already described as employed in the previous experiments, was inserted through a small incision made at the upper limit of the chosen portion of the bowel. The balloon was

FIG. 4.—Showing the denervated region of the bowel which was distended in the usual way.

inflated to a pressure somewhat higher than that employed in the previous series. Twelve animals have been experimented upon in this way and none have shown the usual signs of obstruction. So far, however, we have been unable to keep any of these animals alive indefinitely with the balloon in position. Two obstacles, insurmountable so far, have been encountered. In the first place, one or other end of the rubber tubing, which must be fairly resistant in order to remain patent against the pressure of the distending balloon, has eroded and perforated the bowel wall, usually in two or three days. For this reason peritonitis has been the cause of death in the majority of the animals in which the bowel was distended after denervation. One animal, however, developed snuffles on the day following operation and died of pneumonia on the third day. The second difficulty has been the movement downwards of the balloon and its passage *per anum*. This was the invariable termination of the experiment in animals which did not suffer perforation of the bowel. The highly significant fact, however, emerges from these experiments that not one of these animals died within 54 hours—the longest period survived by an animal (No. 93) with a distended, innervated bowel. The average survival time of the animals in which the bowel was distended without denervation (Table III) was 29 hours, whereas it was 75 hours in the denervated group. The immediate post-operative appearance of the two groups is also entirely different. The denervated animals appear perfectly normal for the first 48 hours after operation. They became ill only upon the advent of peritonitis. If the balloon is passed they show no ill effects whatever throughout the experiment. The animals in which the bowel was not denervated are seriously ill and usually prostrated a few hours after operation, unless the balloon becomes displaced.

DISCUSSION

The results of the experiments reported in this paper show clearly that distension of the bowel wall, unaccompanied by occlusion of the bowel lumen, will produce all the symptoms characteristic of the more acute types of intestinal obstruction. The degree of distension exerted upon the bowel is no greater than that which, as shown by x-ray examination, is produced in a closed isolated loop. The stretching of the bowel wall by the distending balloon acts, we believe, as a stimulus to afferent nerve endings in the bowel wall or mesentery. The immunity to the effects of distension shown by animals in which the nerve connections of the distended portion of bowel have been severed, when compared with the severe effects of distension shown by animals in which the nerve supply has remained intact, support us in this belief. The experiments of Herrin and Meek, in which the effects of distension of a fistulous loop were annulled by division of the nerves supplying the isolated bowel segment, also indicate that afferent nerve impulses are capable of producing serious symptoms and death. These observers believe, however, that the nervous factor serves only to bring about increased secretion and that such secretion, through the depletion of the body's chlorides, is the essential lethal factor. In our experiments the survival time was much shorter than in the experiments of Herrin and Meek, and yet no significant reduction in the blood chlorides occurred. The duration of life after operation of our animals was about the same as that of the animals in the original experiments of Stone, Bernheim, and Whipple. The animals in Herrin and Meek's experiments lived

from 8 to 14 days. The facts that death occurs without any important fall in blood chloride, and that the chlorides may be reduced to levels much lower than are seen preceding death from obstruction without serious symptoms resulting, surely show that chloride loss is not the primary cause of death. The observation that animals with the less acute form of obstruction show a gradual fall in chloride proves little. As already mentioned, the longer the animal lives the more profound is the chloride loss. The reverse relationship, namely, the more rapid or the more pronounced the depression of blood chloride, the shorter the survival time, would be evidence supporting the belief in the importance of chloride loss as the cause of death. Such a relationship, however, has not been established. Dehydration cannot be the direct cause of death in our animals, since the amount of fluid lost by vomiting is negligible. The tissues of Herrin and Meek's animals had a normal water content. Miller found a slight reduction in the water content of the blood in obstructed animals, but the fluids of the tissues generally showed no significant change.

If the bacterial origin of the train of events following obstruction of the bowel may be put out of court, and if our contentions be well grounded that dechlorination or dehydration do not offer a satisfactory explanation, then the view that reflex disturbances brought about through afferent nerve stimulation is the essential cause of death gains force.

The course of events in obstruction is visualized as follows. When the bowel becomes obstructed a certain amount of fluid collects above the obstructed point and moderately distends the bowel wall. The stimulus of distension sets up peristaltic waves above, which, travelling downwards, drive the fluid against the block and increase the distension above this point. During the x-ray examination of a closed loop we have repeatedly seen such peristaltic waves pass over it in rapid succession. The waves appear to completely obliterate the bowel lumen in their passage and to sweep the loop's contents into its distal end, which in consequence becomes greatly distended to what would seem almost the point of rupture. This acute distension will without doubt act as a stimulus to further secretion and more active peristalsis. These in turn will increase the distension of the distal portion of the loop. In this manner a vicious circle is established which cannot be broken until the obstruction is relieved or paralysis or rupture of the bowel occurs. From these considerations it would appear that measures which may be calculated to prevent or relieve the distension and so reduce afferent nerve stimulation, or drugs such as atropine which in maximal doses will suppress motor and secretory impulses should hold out the greatest hope of success in combating the early and acute effects which follow obstruction of the bowel.

Several observations upon obstruction are rendered clearer if distension be considered the exciting cause of the symptoms. The greater severity of high than of low obstruction may be explained by the greater irritability of the upper portions of the intestinal tract. The greater intensity of the symptoms in the case of a closed loop than of a simple obstruction of the bowel in its continuity accords with the view that distension is the essential factor. When the bowel is simply tied across fluid can drain oralwards, and a high pressure is less readily attained. Small closed loops are more quickly fatal than larger ones, also probably for the reason that the filling of the latter with secretions to a critical pressure is longer delayed. The reason that an inflated balloon causes such rapid death is also likely due to the fact that a high degree of distension is established at once, whereas in closed loops a certain time must elapse before sufficient fluid has collected to produce the required degree of distension.

It is not our desire to leave the impression that we believe the loss of chloride to be of little importance in shortening the survival time of animals that do not succumb to acute obstruction. We do maintain, nevertheless, that even in these, dechlorination is merely an auxiliary of death; it hastens the fatal issue but is not the essential cause. In those instances in which death occurs rapidly it can play no rôle. If, however, death does not occur for some days chloride loss and other changes in blood chemistry follow and act as contributory causes to aggravate the condition. The nervous factor, though less prominent at this stage, is, nevertheless, not in abeyance, and through this death is brought about. In no other way can the death which occurs 8 or 10 days after obstruction with the blood chlorides much higher than that of an apparently well animal be satisfactorily ex-

plained. The nature of the reflex reactions initiated from the distended bowel is an interesting and important subject for future research.

We are not rash enough to draw conclusions from our experimental results and attempt to apply them to acute intestinal obstruction as seen clinically, yet we are tempted to suggest that the acute symptoms which result when the bowel is distended by a balloon are perhaps comparable with certain acute types of obstruction seen in man—such as the sudden stoppage of the intestine by a band, an obstructed appendix or a Richter's hernia. The acuteness of the latter condition, in which there is no obstruction (Fig. 5) but a portion of the bowel lumen only,

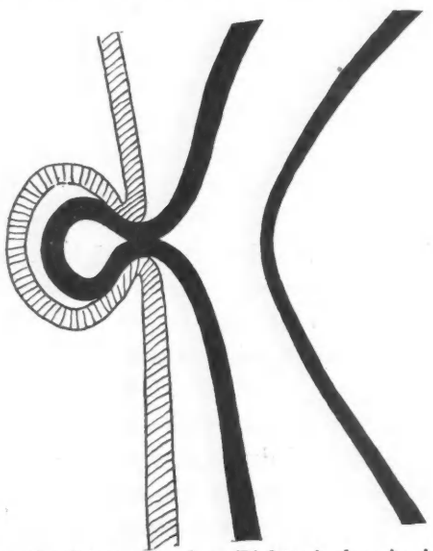

FIG. 5.—Diagram of a Richter's hernia in which only a portion of the bowel's lumen is occluded.

is pinched off, can, in our opinion, be explained best by the conception that the herniated bowel is acutely distended by secretion and gas. (Distension in other hollow viscera, gall-bladder, stomach, kidney-pelvis, can cause the most intense reactions). If in those surgical emergencies involving sudden closure of the lumen of some part of the intestinal tract death does not occur and the obstruction is not relieved, the distension becomes more general and fæcal vomiting, chloride loss, alkalosis and dehydration result. This stage in a way finds its parallel in the less acute experimental condition which, as we have seen, is associated with a fall in blood chloride, progressive prostration and death.

SUMMARY

The results of the experiments described in this paper have led to the conclusion that distension of the bowel wall is the important factor in the production of the symptoms of experimental intestinal obstruction. Chloride loss, in itself, is not the cause of death, since animals in which the bowel has been distended die before any significant fall in blood chlorides occurs. On the other hand, the blood chlorides may be reduced to low levels in animals, otherwise normal, without serious effects.

We wish to express our cordial thanks to Dr. C. H. Best for the interest he has shown in these experiments.

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INDUCTION OF LABOUR BY USE OF PARTURIENTS' URINE.—S. S. Barjaktarovic (*Zentralbl. f. Gynäk.*, March 18, 1933, p. 628) quotes the observations of Guérin-Valmale, Loriot, and Verdeuil, who in two patients ten days before term found that rectal injection of urine from parturient patients was followed in twelve hours by onset of labour pains; they ascribed this effect to the excretion in the urine of parturients of the excess of labour-determining hormones. Trying a similar method in ten patients, Barjaktarovic found it to fail in the early months, but to be followed by commencement of labour or induction of abortion in six patients who were from five to ten months pregnant; these included cases of placenta prævia, hydramnios, or post-maturity. Large doses of urine were given, drop by drop, 400 to 500 grm. at a time; usually a daily repetition was necessary, and up to three litres were required. Parenteral injections of urine from parturients induced abortion in rats and mice; injections of ovarian or anterior pituitary hormone were ineffective. The active agent in the urine of labour patients is regarded as a hormone, probably of placental origin.—*Brit. M. J.*, 1933, **2:** Ep. 4.

RECENT ADVANCES IN THE PHYSIOLOGY OF THE CAPILLARY CIRCULATION*

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OF the various fields of physiology there is probably none in which more important advances have been made in the last dozen years than that concerned with the capillaries and other minute vessels. The discovery that the capillaries are independently contractile and dilatable is in itself of a most revolutionary kind, and involves implications of the widest importance for practical medicine and surgery.

The capillaries themselves were first observed and described in 1661 by Malpighi. They are in man 7 to 8 micra in diameter, which is approximately that of a red corpuscle; their endothelial lining is continuous with that of the arterioles and venules. The capillaries exist in the form of a network, pervading the tissues and varying in texture according to the particular tissue. Thus in muscle the meshes are long, narrow and elongated in the direction of the muscle fibres; in the lungs, secreting glands and in fat the meshes are rounded; in the papillæ of the skin and in mucous membranes the capillaries form simple loops. In a layer lying between the vitreous humour and the retina in the frog peculiar cells embracing the capillaries were discovered by Rouget in 1873; these cells, since that time called Rouget cells, have been considered by many physiologists to be responsible for the contractility of the capillaries, although such a power has been denied to them by others.

DIRECT OBSERVATIONS OF LIVING CAPILLARIES

The earliest to observe contractions of living capillaries was Stricker, in 1865. In the excised nictitating membrane of the frog he noted contractions and relaxations of the capillaries, reactions, which were obviously independent of the heart beat. The contraction, however, he erroneously attributed to swelling of the endothelial cells. Steinach and Kahn in 1903 applied faradization to the isolated nictitating membrane of the frog and observed capillary constriction. The contraction, they noted, may be at first at various points, later becoming general; or it may be generalized from the first. With the closure of the lumen folds appear in the wall, so that swelling of the wall cannot cause the constriction as supposed by Stricker. Contractions sometimes take place repeatedly in certain parts of a capillary or in particular capillaries, others meantime being exempt from the reaction. They attributed the contractility to the Rouget cells (Fig. 1). Steinach and Kahn further observed that stimulation of the sympathetic chain of ganglia evoked contraction in the capillaries of the nictitating membrane, the latency being naturally longer than on direct stimulation.

Among recent investigators of the capillaries Professor August Krogh,[2] of Copenhagen, stands out prominently. In 1919 he published, in the *Journal of Physiology*, a paper dealing with his observations on capillary contractility. He studied, in the first instance, the mucous membrane of the tongue of the anæsthetized frog. The membrane was pinned out, the lower side up, and examined by transmitted light with the binocular microscope; it was seen to be first red, then pale, owing to capillary dilatation followed by constriction. Mechanical stimulation with a fine glass hair along a venule was seen to cause the opening up of a capillary and the establishment of a flow from the corresponding arteriole. Resting and active muscles were examined in the frog and guinea pig. Resting muscles are pale, with few capillaries visible and these of narrow calibre; on the other hand, contracting muscles exhibit dilated capillaries with rapid circulation through them. Following activity the muscle capillaries constrict once more to their original calibre. For purposes of confirmation India ink in saline was injected; again, resting muscles show few capillaries, while active muscles exhibit numerous capillaries fully dilated. In an observation on the extensor tarsi muscle of the frog there were, when at rest,

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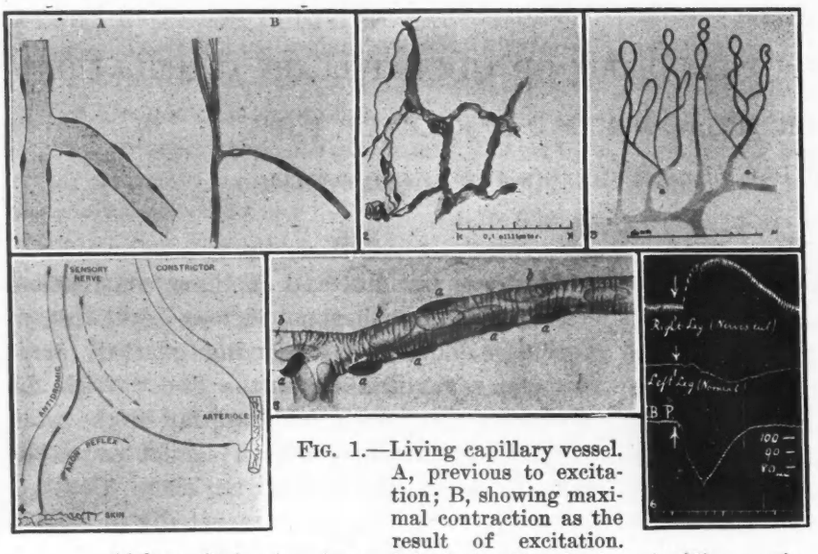

FIG. 1.—Living capillary vessel. A, previous to excitation; B, showing maximal contraction as the result of excitation. (After Steinach, from Schafer's Text-book of Microscopic Anatomy, Longmans, Green & Co.).

FIG. 2.—Innervation of capillaries of frog's tongue; nerve-fibrils enter Rouget cells. (After Busch, from Krogh).

FIG. 3.—From skin of nail bed; horny layer removed—terminal arterioles, a, capillary loops, venules and subpapillary venous plexus. (After Lewis).

FIG. 4.—Course of antidromic impulses to skin, liberating "H-substance," showing also axon reflex concerned in "red flare" and in action of counterirritants. (After Lewis, Blood Vessels of Human Skin, Shaw & Sons, Ltd., London).

FIG. 5.—Large capillary showing Rouget cells (a) with muscle fibrils surrounding the capillary. (After Krogh, Anatomy and Physiology of Capillaries, Yale University Press).

FIG. 6.—Effect of 0.01 mg. histamine on arterial pressure and limb volume. (After Dale and Richards, from C. Lovatt Evans, Recent Advances in Physiology, J. & A. Churchill, London). This figure was taken originally from the *Journal of Physiology*.

so few capillaries visible that they could not be counted; on contraction there were 195 in 1 sq. mm.

THE MECHANISM OF CONTRACTION OF THE CAPILLARY WALLS

As already stated, the Rouget cells, discovered in 1873, are regarded by many physiologists and histologists as being responsible for the unquestionable contractility of the capillaries. This power was attributed to them by their original discoverer, as also by Steinach and Kahn. In support of this view may be mentioned the researches of Vimtrup, who studied the capillaries of the frog's tongue and found them surrounded by Rouget cell nuclei distinct from those of the endothelial wall cells. The protoplasm of the Rouget cells he found to contain fibrils which extend around and along the capillary, joining with those of adjacent cells (Fig. 5). In the tail of the newt he saw contraction begin at the Rouget cell's nucleus. Tannenberg, likewise, saw contraction of Rouget cells in the mesentery of the rabbit. Bensley agrees with Vimtrup as to the fibrillar nature of the protoplasm of the Rouget cells; he also attributes to them the power of capillary contractility.

As a result of these investigations Krogh concluded that the capillaries are surrounded by scattered contractile Rouget cells, forming an open network, leaving the greater part of the capillary exposed for metabolic interchanges. The Rouget cells form contractile fibrillæ which embrace the capillaries and the cells are believed to be present in all tissues of mammals, lower vertebrates and many invertebrates. They are considered to form a direct transition from the muscle fibres of arterioles.

Other investigators express doubts as to the function of the Rouget cells. Thus E. R. and E. L. Clark claim to have observed contractions in capillaries in which no Rouget cells were discernible. Florey and Carleton also failed to observe Rouget cells around the capillaries of the mesentery, the contractions of which they clearly observed. Accordingly, these writers, while supporting strongly the belief in independent capillary contractility, decline to relate it to the Rouget cells; these may, indeed, be separated by a definite space from the capillary wall, a space which according to them is not a result of fixation shrinking. Like Aschoff, they regard the Rouget cell as part of the reticulo-endothelial system.

We must conclude, therefore, that while inherent contractility undoubtedly exists in the capillary wall it has not yet been proved whether this contractility is dependent on the Rouget cells or resides in the endothelial cells themselves. The supporters of the latter view call attention to the close resemblance between the capillary endothelial cell and the contractile white corpuscle.

THE INNERVATION OF THE CAPILLARIES

Non-medullated nerve-fibres of sympathetic origin have been described by Woollard as forming a diffuse plexus around the capillaries. Although definite nerve-endings were not seen by this observer, such must logically be considered to exist, as shown by the effects of nerve stimulation. Busch asserted that fine nerve fibrils penetrate the Rouget cells in the tongue of the frog (Fig. 2). The results of nerve stimulation, as just stated, support the belief in the nervous control of the capillaries. Thus, Steinach and Kahn found that stimulation of the sympathetic ganglionated chain in the frog causes constriction of the capillaries in the nictitating membrane. Hooker observed that stimulation of the cervical sympathetic in the cat causes constriction of the capillaries and venules in the ear, a response independent of that in the arterioles. Harris and Marvin, on stimulating the same nerve in the rabbit, after obstruction of the arterial flow, noted independent constriction of the capillaries of the ear. Constriction of the capillaries of the web of the frog was observed by Krogh on stimulating the lower sympathetic chain. Krogh also recorded dilatation of the capillaries in the ear of the rabbit following section of the cervical sympathetic; the capillaries regained their intrinsic tone after a day or two. Krogh contends that the continuous capillary tone is dependent on a small quantity of pituitrin in the blood; according to Dale and Richards the tone is due to the presence of a minute quantity of adrenaline.

THE NERVOUS DILATATION OF CAPILLARIES

The observation that stimulation of the dorsal or posterior spinal roots evokes dilatation of capillaries was made by Bayliss and other physiologists. The effects are produced by antidromic impulses travelling along sensory fibres and it is generally believed that such impulses can only be evoked in experimental or morbid conditions. Since the capillaries do not apparently receive medullated nerve-fibres which might serve for vasodilatation, Sir Thomas Lewis[3] was led to conclude that the antidromic impulses liberate a histamine-like or "H-substance" from the epidermal cells of the skin and that this substance then acts on the capillary walls so as to dilate them. The capillary dilatation is thus not evoked by direct nervous action on the capillaries but through liberation of H-substance (Fig. 4). Herpes zoster is explained by Lewis as being due to antidromic impulses set up in sensory nerves by inflammation of the dorsal or posterior root ganglia; the impulses liberate H-substance in the skin and thus the vesicles are caused by capillary dilatation and exudation. Of similar causation he regards the herpetic eruptions sometimes met with as sequels to lesions of sensory nerves or their ganglia.

OBSERVATIONS ON THE CAPILLARIES OF THE HUMAN SKIN

Of all the recent contributions to our knowledge of the circulation in the minute vessels none are of greater moment than the classical studies of Sir Thomas Lewis published in his great monograph, "The Blood Vessels of the Human Skin and their Responses." Although the anatomy of the skin vessels had been described in detail by Spalteholtz, nevertheless the study of the behaviour and normal responses of these vessels had been largely neglected.

Lombard had found in 1912 that the capillaries of the human skin might be directly observed microscopically by covering the skin with a layer of oil and illuminating it laterally; the light must be intense and the heat rays must be filtered out. A good site for examination is the skin at the base of the nail, although Lewis has studied the minute vessels in many other locations. A better view may be obtained by blistering and removing the superficial layers of skin, a procedure often resorted to by Lewis. The following account is based on Lewis's large work referred to above.

ANATOMY OF THE MINUTE VESSELS OF HUMAN SKIN

The number and size of the vessels of the skin vary in different situations, being greater in the skin of the palms and soles; these are, however, typical of all parts of the skin. The arteries form in the deepest layer of the cutis a *cutaneous arterial plexus*; from this arched vessels pass outwards to form the *subpapillary arteriolar plexus*; terminal arterioles then pass to superficial layers of the skin, giving off twigs to the *capillary loops* lying in the papillæ. The muscle coat of the arterioles progressively thins out, becoming scattered and finally, according to Vimtrup, coming to be represented by Rouget cells. Venous loops return the blood to an outer network and from thence to a secondary venous

network, both constituting the *subpapillary venous plexus,* which lies slightly superficial to the arterial plexus. Of this system the capillaries, collecting venules, and venules of the subpapillary venous plexus consist of endothelium only, with, in the capillaries, the Rouget cells, if we accept the existence of these elements. The entire apparatus serves for the metabolism of the skin, for the blood supply of the sweat glands and for radiation of heat (Fig. 3).

SKIN COLOUR

The suffused or reddened colour of the skin is mainly contributed to by the subpapillary venous plexuses, which have a much greater surface area than the capillary loops. If pressure be applied to the skin with a glass slide pallor develops at the moment of collapse of the venous plexus, which precedes that of the capillaries. The vessels visible in the cheeks of outdoor workers are caused by dilatation of the superficial venules.

THE VASCULAR REACTIONS OF THE HUMAN SKIN

Various *taches* or reactions of the skin have been described, and some of them have been regarded as pathognomonic of particular diseases. Lewis found these viewpoints misleading, the skin reactions often occurring under normal conditions, or, at any rate, under morbid states different from those with which they are generally associated.

On gently stroking the skin with the end of a ruler there appears a "white reaction" or *tache,* which is momentarily preceded by a slight flush. These responses are caused by alterations in the diameter of the minute vessels, being independent of the action of arterial pressure or of nerves. Direct observation shows that in the white reaction there is contraction of the minute vessels due to direct stimulation of their walls. Thus it was seen by Ebbecke to occur in skin to which the nerve supply had long been lost; across sensitive and insensitive areas the reaction is indistinguishable. It is, further, independent of arteriolar constriction, since, after shutting off the arteries with the cuff of the sphygmomanometer, the white reaction still occurs. It is thus clear that it is due to a local, direct stimulation of the capillary walls and their independent contraction in response to mechanical stimulation.

Allied to the white reaction are the responses to adrenaline and pituitrin: each of these substances injected subcutaneously causes capillary constriction and adrenaline has been stated to act apart from nerve supply, though this statement requires confirmation in view of the mode of action of adrenaline generally accepted.

A firm stroke applied to the skin evokes in 3 to 15 seconds the so-called "red reaction," which lasts for a few minutes to half an hour. Sometimes it is flanked by a white reaction on each side. This reaction also occurs after occlusion of the arteries to the limb and in the absence of nerves to the vessels. It is closely limited to the region stimulated and consists in a dilatation of the minute vessels (terminal arterioles, capillaries and venules). According to Lewis it is not due to mechanical stimulation of the vessels, since this causes contraction as a general rule; it is dependent rather on the liberation of H-substance from damage to the tissue cells.

In a susceptible skin the red reaction may be surrounded by a *flare* or spreading flush. This flare is due to an axon reflex initiated through one branch of a sensory axon to the skin and the other branch to a strong arched arteriole. In support of this view it may be stated that the flare does not develop in the absence of the skin nerves, the axons of which send one branch to the skin and the other to an arteriole, as discovered by Woollard. Furthermore, the flare is proved to be an arteriolar reaction, since it fails to develop after occluding the arteries of the limb. That the capillaries play any rôle in the red flare seems doubtful from the evidence at present available, since they are not known to be supplied by dilator nerves. It is believed by Lewis that the axon reflex concerned in the red flare is not only produced by mechanical stimulation but is much enhanced by H-substance acting on the sensory side of the axon reflex arc (Fig. 4).

Following the red reaction and in the same situation there develops, in the skin of susceptible people, a localized œdema or wheal. "Dermatographism" of this kind has long been regarded as symptomatic of various diseases. The formation of a wheal in response to powerful stroking is, however, the rule in children and is quite common in young adults. It is, further, the usual response in the horse, following a blow with the whip. The total reaction to stroking, namely, the local reddening, the flare and the wheal, Lewis designates the "triple

response." The wheal, like the red reaction, is due to the liberation of H-substance, but in excessive amounts; this then causes powerful dilatation of the minute skin vessels with resulting œdema.

SUNLIGHT AND ULTRAVIOLET LIGHT

The reddening of the skin by the action of sunlight or ultraviolet light is of the same nature as the "red reaction" to strong mechanical stimulation, and is due to dilatation of the minute vessels, namely, the terminal arterioles, capillaries and venules. It likewise is independent of any local nervous mechanism occurring in skin to which the nerves have degenerated. Lewis considers it due to the liberation of H-substance.

THE ACTION OF COUNTERIRRITANTS

The action of a mustard plaster or other similar counterirritation of the skin is comparable to the red flare, described above; it thus depends on an axon reflex from the skin to an arteriole. This was proved by Ninian Bruce, who experimented on the conjunctiva, and by Breslauer, who studied the skin; thus the irritant plaster action continues for a short time after cutting the nerves to the skin, but finally disappears after degeneration of these (Fig. 4).

THE CAPILLARY CIRCULATION AND SURGICAL AND OTHER FORMS OF SHOCK

During the War extensive and elaborate investigations were undertaken in Great Britain to determine the nature and mode of causation of various forms of surgical shock. These researches met with an extraordinary measure of success, since, not only were some of the basic factors in shock ascertained but also valuable light was shed on the physiology of the capillaries.

It was discovered that a highly important element in the production of surgical shock is extensive damage to tissues, as an outcome of which there develops protein decomposition, with the formation of various chemical substances, of which histamine appears to be a type. Histamine itself, when injected into an animal in considerable quantities, causes symptoms closely resembling those of surgical shock and found on analysis to be associated with lowered blood pressure and increased limb volume (Fig. 6). Both of these effects are obviously due to capillary dilatation, since histamine, when applied directly to capillaries in the mesentery of the cat causes them clearly to dilate. Accordingly, it is evident that histamine and other similar substances emanating from wounded tissues induce powerful dilatation of capillaries with increased transudation through their walls; there result in consequence lowered blood pressure with the phenomena of surgical shock. It seems probable that extensive burns involve a similar liberation of poisonous chemical substances, so that there is a logical basis for the treatment of burns with coagulants like tannic acid, which tend to limit this injurious process of toxic absorption.

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ATROPINE IN PARKINSONISM.—G. Kinberg (*Nord. Med. Tidskrift*, March 11, 1933, p. 292) states that in Germany it has been calculated that there are more than 30,000 persons suffering from the effects of lethargic encephalitis. The treatment of these cases has hitherto been very unsatisfactory. Roemer's experience in 104 cases with large doses of atropine is encouraging, as is the author's with six cases. The rationale of this treatment is based on Bremer's observation that the tolerance to atropine in this class of patient is exceptionally great. It tends to increase with the severity of the disease, although in the acute stage atropine has no special action. While, according to Haffner, the ordinary doses of atropine act only on the peripheral nervous system, in large doses the drug acts on those parts of the central nervous system involved in lethargic encephalitis. The dosage begins with 1 drop three times a day of a 0.5 per cent solution. This dosage is doubled on the second day and trebled on the third. This increase of the dosage by 1 drop is continued until the tenth day, when 10 drops are given three times a day. The dosage is now increased every other day by 1 drop until 20 drops are given thrice daily. It is now increased only every third day until the optimal dosage is reached. Dryness of the throat is no indication to stop raising the dosage, as this symptom usually disappears with a further increase of the drug. If, however, giddiness, palpitation of the heart, and gastric disturbances occur, it may be necessary not to increase the dosage for the next few days. The optimal dosage is reached when there is no further improvement to be noted in the signs and symptoms. The dosage is now decreased by 1 drop twice a day until the old symptoms begin to reappear. The process is then reversed and the dosage increased again. This treatment, it is stated, should be carried out in a hospital, and requires on the average three months.—*Brit. M. J.*, 1933, **2**: Ep. 2.

KITTEN CARRIERS OF *MICROSPORON FELINEUM* AND THEIR DETECTION BY THE FLUORESCENCE TEST

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INTRODUCTION

IN Winnipeg, with the aid of a grant from the Banting Research Foundation of Toronto, investigation into dermatomycoses is being carried out from both the clinical and mycological points of view. In a preliminary list of fungi isolated[3] reference has already been made to the suspected infection of human subjects with ringworm from cats. In the course of the work 85 cases of ringworm in children have been studied in some detail, and an analysis of the records indicates that cats play an important part in disseminating the disease. It is difficult to obtain direct evidence of infection from animals, but our observations indicate that the disease may be spread not only by cats with obvious ringworm but also by apparently healthy cats which act as carriers. The detection of such infected animals is an important prophylactic measure.

The transmission of ringworm to man from infected pet animals is recorded in the literature by various observers, but whether or not transmission is frequent does not seem to have been established. Müller and Glass[10] cite Schindelka to the effect that the majority of cases of ringworm that originate in man are due to contact with diseased dogs. On the other hand, Hare and Tate[6] in an epidemiological survey isolated *Microsporon audouini* from 48 out of 54 cases of small-spored ringworm occurring in London County Council schools. Since this species is not known to cause ringworm in animals, they concluded that "Among school children in London the infection with animal ringworm is negligible, and the children themselves are the chief source of infection."

According to Sabouraud,[12] Fox and Blaxall in 1896 were the first to record the transmission of ringworm from cats to man. Fox and Blaxall[5] are usually cited as authorities for the species *Microsporon felineum;* on the contrary, however, they appear to have left the fungus which they isolated unnamed, and to have regarded it rather as an ectothrix than as a microsporon. Mewborn[9] in New York records the transmission of ringworm from a kitten to a girl, and appears to have been the first to refer to the fungus as *Microsporon felineum.* Roberts[11] isolated a similar organism from a kitten which had apparently spread the disease to seven adults, six children, a dog, and another kitten. Sabouraud frequently observed infection of children from cats by a fungus which he considered, from its macroscopic appearance in culture, to be a distinct species, *Microsporon lanosum* Sabouraud. In this paper, while prefering to retain Sabouraud's generic name for this species, we have followed Langeron and Milochevitch[7] in joining *M. lanosum* Sabouraud 1907 with *M. felineum.* Sabouraud[14] himself wrote, "rien ne saurait différencier mycologiquement le *Microsporum felineum* du *Microsporum lanosum.*"

A few other dermatophytes are recorded as transmitted from cats to man. Thus Thomson[16] reported the infection of three children with ringworm from a kitten due to a dermatophyte which he referred to as "microsporon radiatum." Sabouraud[13] suspected that infection with *Trichophyton radians* was acquired by human beings from cats, but he was never able to confirm this by demonstrating infected animals. Sartory[15] regarded *T. radians* Sabouraud as synonymous with *T. felineum* R. Blanchard 1896, while Vuillemin[17] changed the name *Trichophyton felineum* to *Microsporon felis* Vuillemin.

THE OCCURRENCE OF INFECTION FROM CATS IN WINNIPEG

Sabouraud divided the genus Microsporon into two groups: (1) human microsporons, typified

by *Microsporon audouini*, which can only be inoculated with difficulty, if at all, into the laboratory animals, and which is not known to cause ringworm in animals; and (2) microsporons of animal origin, typified by his *M. lanosum* (*M. felineum*), which can be inoculated into animals with ease, and which are found to cause ringworm in cats, dogs, and horses.

A comparison of the relative frequencies with which the animal and the human species of microsporon occur on human subjects provides one kind of evidence regarding the prevalence of infection of man from animals. This evidence alone is often inconclusive, as, for example, the occurrence of a large proportion of species of animal origin cannot be taken to prove that infection from animals is frequent, since infection may not have been direct from an animal but may have taken place from another child. This statistical evidence is of value when supplemented by examining personally possible animal contacts with each patient. Table I shows the number of microsporons of human and animal origin which have been isolated and studied in culture from cases of human microsporosis at Winnipeg.

TABLE I

The species of microsporon isolated from ringworm patients at Winnipeg

Species	*Number of patients from which isolated*	*Percentage of total*
Microsporon audouini	43	57
Microsporon felineum	32	43
Total	75	100

These figures show that *M. audouini* was isolated from more cases than was *M. felineum*. However, 19 of the 43 cases from which *M. audouini* was isolated were inmates of one orphanage, so that an undue prominence is given to this species. In Table II, therefore, are shown the numbers of separate *outbreaks* with which each species was associated. All patients with the same type of ringworm who are known to have been in contact with one another are included in one outbreak.

TABLE II

The species of microsporon causing outbreaks of ringworm at Winnipeg

Species	*Number of outbreaks*	*Percentage of total*
Microsporon audouini	14	37
Microsporon felineum	24	63
Total	38	100

Table II shows that the greater number of outbreaks (63 per cent) were due to *M. felineum*, one of the microsporons of animal origin.

For several reasons it was difficult definitely to convict pet animals of transmitting infection. It was often impossible to obtain access to the animals for inspection. The suspected animal was sometimes found to have been destroyed by its owners, or for various other reasons to have left the family. Again, the owners sometimes refused permission to inspect the animal, possibly from fear that it would be maltreated. In such cases, suspicion rests upon statements made by the parents of the patients to the effect that the animal had sores similar to those on the child. In five outbreaks the parents spontaneously reported their suspicion of some animal; in seven others, they only admitted after questioning that the patient had been in contact with an animal having mangy patches or sores. In certain other cases, the parents admitted contact with a cat but denied that the animal was diseased. Such cases are probably irrelevant to the subject of the present paper, as most children handle cats at intervals. However, in view of the observations to be described below, it is possible that some of these apparently healthy animals may have been carriers.

Direct suspicion attaches to cats in 11 out of the 24 outbreaks of ringworm due to *M. felineum*, and to a mangy dog in one other such outbreak.

One kitten which was examined several weeks after ringworm lesions were first noted on a child in contact with it, showed only bare areas on the tail, and the presence of the parasite could not be demonstrated with the microscope. Possibly this animal was recovering from the disease. Another cat which was suspected of infecting two children was found, when examined, to have sores. In another outbreak, sores were noted on a suspected dog.

One case was investigated in greater detail and yielded interesting results which are described in the two following sections of the paper.

CLINICAL HISTORY OF A CASE OF TINEA CAPITIS IN A CHILD

On September 10, 1932, a boy, aged five years, was seen with lesions on the face and body. These were of an impetiginous nature and were treated in a routine manner with white-precipitate ointment. The condition persisted, and on November 3, 1932, when lesions appeared on the scalp, a diagnosis of tinea capitis was made and the patient was referred to us for treatment.

When examined on November 5, 1932, the lesions on the face and body strongly resembled impetigo. There was a large area on the left parietal region of the scalp about two inches in diameter. Scattered over the rest of the scalp were several smaller lesions averaging about one inch in diameter. The younger lesions presented a scaly appearance and the older lesions were crusted and looked pustular. When these crusts with hairs imbedded in them were removed, a thick exudate was adherent to the under side. Broken hair stumps were removed from the scalp lesions with forceps. When examined under the microscope they showed the mosaic arrangement of spores which characterizes the microsporon type of infection.

When the whole head was examined with the ultra-violet radiation transmitted by a filter of Wood's glass, a bright fluorescence was observed in the hairs of the scalp lesions. Several other lesions, not evident in daylight, were found by their fluorescence on the vertex and on the right parietal area. Single fluorescent hairs were removed with sterile forceps, and after being soaked for two minutes in 95 per cent alcohol were allowed to dry and placed upon the surface of slants of Sabouraud's maltose "proof agar." The isolation tubes were left at room temperature, and cultures of *Microsporon felineum* were obtained from these hairs.

The boy's head was shaved and four days later was re-examined. Many isolated fluorescent hairs, which no doubt were previously obscured by the long, healthy hair, were then revealed. On this occasion two contacts were reported, the mother and another member of the family, both of whom showed circinate lesions on the glabrous skin.

EXAMINATION OF A KITTEN CONTACT

On the first occasion on which the boy was seen by the writers the mother stated that two to three weeks before the first lesions were noticed, he had been given a kitten, which he played with constantly and took to bed with him. The mother had never noticed mangy patches or visible sores on the kitten and believed it to be healthy. Nevertheless the kitten was at once brought to the laboratory for examination. As shown in the photograph reproduced in Figure 1, bald patches, scaly or erythematous areas were lacking, and careful inspection revealed no clinical signs of ringworm. An animal pathologist to whom the kitten was shown confirmed this observation and stated that he found no signs of ringworm. Hairs taken at random from the body of the animal showed no evidence of attack by fungi. As far as this examination went, therefore, the kitten would have been cleared of suspicion. However, as is the practice with all cases suspected of ringworm referred to this laboratory, the kitten was examined for fluorescence in ultra-violet light. A few scattered hairs then stood out by reason of their brilliant green fluorescence. When examined under the microscope the shafts of these hairs were found to be penetrated and disintegrated by hyphæ, and surrounded by a broad sheath of small spores. Only fluorescent hairs were found to be infected. They occurred on the head and the right shoulder, and each fluorescent hair lay inconspicuously among long, normal hairs. On the head a few hairs were scattered over the nose, one or two at the margin of each eyelid, and a considerable number within each ear. The distribution of the infected hairs on the head as revealed by their fluorescence is shown diagrammatically in Figure 2.

A culture was obtained from infected kitten hairs by the same technique as that adopted in making cultures from the boy. The fungus growing in culture from the kitten exactly resembled that grown from the boy, and is

FIG. 1.—Photograph of head of kitten showing apparently healthy condition of hair.

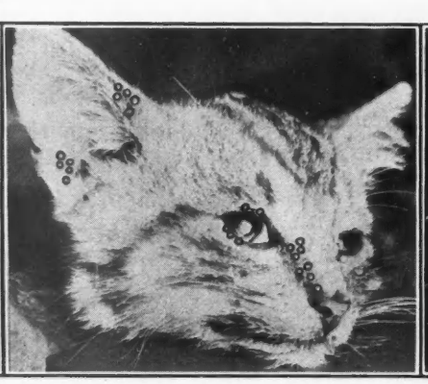

FIG. 2.—The distribution of the fluorescent hairs infected with microsporon represented diagrammatically. The circles represent the position of each fluorescent hair on the right side of the face. In the ear the hairs were more numerous and the circles only represent the distribution of the fluorescent hairs.

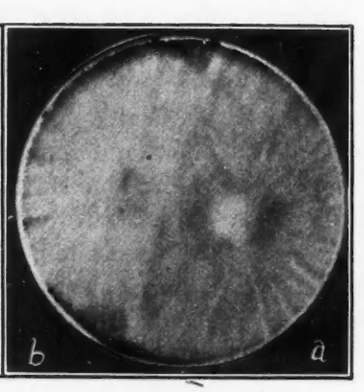

FIG. 3.—Petri-dish culture on Sabouraud's maltose agar showing similarity of the *M. felineum* isolated from the boy (a) with that from the kitten (b).

likewise regarded as belonging to *Microsporon felineum*. Figure 3 shows the two mycelia grown for comparison in the same Petri dish of Sabouraud's proof medium. Typical fuseaux were formed in both colonies.

As an additional criterion of the identity of these two fungi they were inoculated side by side on hanging drops of medium in order to test for hyphal-fusions as described by Davidson, Dowding and Buller.[1] The medium employed was Sabouraud's maltose "proof" agar diluted with ten times its volume of two per cent plain agar. This slight modification of the method used by the authors cited above was found to result in preparations less densely populated by hyphæ. Further, in the more dilute medium, hyphæ were not observed to grow out from one inoculum, cross the drop, and become lost in the tangle around the opposite inoculum. Confidence could thus be felt that a hypha when traced back to one of the two inocula had actually originated from that inoculum. Under such conditions, with the cultures kept at room temperature, undoubted plasmatic fusions between hyphæ derived from opposite mycelia were observed fourteen days after the preparations were set up. This is taken as being an additional criterion of the identity of the microsporon isolated from the boy with that isolated from the kitten.

It is not certain whether the kitten infected the boy, or vice versa, or whether both acquired the infection from the same or different sources. It has been shown, however, by the hyphal fusion technique and by a comparison of cultures that the organism found in the hairs of the kitten was the same species as that causing the ringworm in the boy. The boy was not of school age and had not, so far as is known, been in contact with another case of ringworm. Further, the lesions on the boy were first noted some two to three weeks after he was given the kitten. From these facts it seems very probable that the boy was infected by the kitten.

The kitten was subsequently kept under observation for five days, during which time no change in its condition was observed. At the end of the period the animal was killed in order to permit of a photograph being taken by fluorescence in order to show the distribution of the infected hairs.

At the time laboratory examination was made, it is considered that the kitten was a ringworm carrier. The word *carrier* is here applied to a seemingly healthy animal, having a pathogenic organism which apparently lives saprophytically in its normal site without producing the gross symptoms of the disease usually associated with that organism. The presence of the organism on the kitten could be demonstrated only by laboratory tests. Whether the kitten in this instance was a healthy carrier, an incubating carrier, or a convalescent carrier cannot be determined, owing to the lack of appropriate data.

INFECTION OF A SECOND KITTEN

There is very little information to indicate whether or not the passage of ringworm infection between animals and man takes place easily. To investigate this subject the boy, while under treatment, was given another kitten. An apparently healthy grey kitten was kept under observation over a period of one month, during which time it was frequently examined with the filtered ultra-violet light. No fluorescent hairs were observed; it was therefore concluded that the animal was free from microsporon infection, and on December 24th it was given to the boy to play with. Despite the fact that the boy was undergoing treatment with fungicidal applications and wore a linen cap, four weeks later the boy's mother reported that the kitten had a suspicious sore on the face. When examined the next day, a scaly lesion denuded of hair, about one centimetre in diameter, was visible between the inner canthus of the right eye and the upper part of the nose. Ultra-violet light showed brilliantly fluorescent hairs on the lesion, and also five isolated fluorescent hairs situated between the principal lesion and the mouth. No other lesion developed on the animal. Spontaneous recovery took place, and six weeks after the lesion was first noticed no fluorescent hairs were present. When fluorescent hairs from the animal were examined with the microscope they showed microsporon infection and from other diseased hairs cultures of *Microsporon felineum* were obtained. The lesion on the kitten became apparent within three to four weeks of its first contact with the boy. It appears highly probable that the kitten became infected from the boy.

Inoculation of a Third Kitten

A further observation which throws light on the possibility of cats and kittens acting as ringworm carriers was made incidentally during a series of experimental infections. A young black cat was infected artificially by direct inoculation. A scratch was made on the inner surface of the ear and a hair infected with *Microsporon felineum* which had been taken from the boy was placed in the scratch. The area was then covered with gauze and secured with adhesive tape. After five weeks a scaly lesion covered with fluorescent hairs developed around the site of the inoculation, and cultures proved the infection to be due to *Microsporon felineum*. In the course of the following five weeks the original infection healed, but a few isolated fluorescent hairs appeared on the eyelids, especially in the inner and outer canthus. Although the number of fluorescent hairs seldom exceeded four or five at one time, they were present during at least three months. The number of spores produced on an animal in this condition must necessarily be small in comparison with the number of spores produced on a ringworm lesion of moderate size. Nevertheless these hairs, which can be detected only by the test of fluorescence in ultra-violet light, must be taken into account as a potential source of infection and the animal must be regarded as a carrier.

Discussion

The test of fluorescence in ultra-violet light was introduced by Margarot and Devèze[8] who in 1925 first submitted hairs from cases of favus and microsporosis to examination by the long-wave ultra-violet rays passing a filter of Wood's glass. They observed the excitation of a green fluorescence in the infected hairs, but not in normal hairs, which appear dark under the rays. The present writers[4] have confirmed these observations and have shown that the fluorescence is due to the presence in such infected hairs of a water-soluble substance which may be extracted as a fluorescent aqueous solution.

The fluorescence test is already used for the diagnosis of ringworm of the scalp in children, and also for observing the progress of treatment and in examining contacts. The facts emerging from this investigation should make the test of still wider application. The value of the fluorescence test in discovering the kitten carrier cannot be over-emphasised. Without this test the kitten would have remained an unsuspected potential source of infection to those coming into contact with it. Only the discovery on the kitten of hairs which fluoresced when exposed to the filtered ultra-violet radiation made it possible to confirm the presence of the fungus by microscopical and cultural methods. Further, the fact that hairs of cats as well as man fluoresce when infected by microsporon shows the test to be of wider application than was formerly believed to be the case, and suggests that the phenomenon may be looked for fruitfully in the hairs of other animals. The occurrence of the phenomenon in cats has subsequently been confirmed by experimentally infecting ten other cats and kittens, all of which developed ringworm lesions with abundant brightly fluorescent hairs.

Ringworm of the scalp in children is responsible for the loss to the patient of much school time, and necessitates lengthy and sometimes dangerous treatment. The study of ringworm in cats with a view to preventing the spread of the disease to human subjects is therefore important. From the standpoint of the public health and schoolboard authorities it is desirable that pet animals which have been in contact with ringworm patients should be tested for the presence of fluorescent hairs in order to detect carriers and infected animals. A convenient apparatus for this purpose has recently been described by the writers.[2]

Summary

While more than half of the *cases* of ringworm due to microsporon studied in Winnipeg were due to *Microsporon audouini*, two-thirds of the *separate outbreaks* were due to *M. felineum*. In approximately one-half of the outbreaks due to *M. felineum* some evidence indicated that infection had occurred from a cat or a dog.

A boy, aged 5 years, became infected with *M. felineum*. The first lesions appeared from two to three weeks after he had been given an apparently healthy kitten. When the kitten, however, was examined under the ultra-violet light passing a filter of Wood's glass, fluorescent hairs were observed which, on investigation, proved to be infected with the same species of fungus as that infecting the boy. The kitten

is therefore considered to have been a ringworm carrier at the time at which it was examined.

The patient, while undergoing treatment, was given a healthy kitten to play with. In from three to four weeks this animal developed a typical ringworm lesion on the nose.

A third kitten was artificially inoculated in the ear with *M. felineum*. After the resulting lesion had healed a few fluorescent, infected hairs remained around the eyes during three months, and the animal is considered to have been, during this period, a ringworm carrier.

It has been shown that the hairs of cats which are infected with *Microsporon felineum* exhibit a fluorescence in ultra-violet light similar to that of infected human hairs.

The extension of the fluorescence test to detect *Microsporon* infection in cats and kittens is suggested as a practical prophylactic measure.

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INTRAPLEURAL PNEUMOLYSIS WITH THE GALVANOCAUTERY

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THE purpose of this paper is to present case reports of 14 patients who have had pleural adhesions divided with the galvanocautery. The adhesions were preventing satisfactory artificial pneumothorax in all cases. The reports are of the first 14 consecutive patients treated in this manner in our institution.

There is no doubt about the importance of closing cavities when they exist in pulmonary tuberculosis. A brief consideration of statistics published by a few clinicians will demonstrate the unfavourable prognosis associated with uncollapsed cavities.

Matson[1] reports a series of 850 cases in which he has found that, when artificial pneumothorax was complete, 48 per cent of such cases could be classed as "apparently well," 20 per cent as "arrested," and 21 per cent as "died"; but, when artificial pneumothorax was incomplete, only 13 per cent were found to be "apparently well," 13 per cent "arrested," and 50 per cent "died." Barnes and Barnes[2] report 1,454 cavity cases. Of these 80 per cent were dead in one year, and 90 per cent in five years. Sprungman[3] reports 626 untreated cavity cases. In two years 61.7 per cent of these were dead, and in sixteen years 78.2 per cent were dead. Of the remaining, 69.1 per cent were disabled, and only 4.1 per cent were working. Under collapse treatment by pneumothorax of 86 labourers, 61.6 per cent were working after one to five years, 21.1 per cent were incapacitated, and 17.4 per cent were dead.

Too frequently artificial pneumothorax is only partially successful in collapsing the lung, because of adhesions between the visceral and parietal pleura. Usually the adhesions are overlying the diseased area of the lung, and it is of that portion that one is most desirous of obtaining collapse. In a certain proportion of these collapse cases, although the cavities do not close, the adhesions become elongated and suitable for division with the cautery. Pneumothorax should be well tried before other procedures are used. It should exist three to six months, or until the collapse has become stationary. The adhesions should be stretched as much as possible, yet they should be cut before cavities become so thick-walled that they will not close even when free to do so.

The Jacobaeus-Unverricht thoracoscope and actual cautery has been used in all cases. No attempt will be made to set forth the advantages or disadvantages of the various techniques, such as the electro-coagulation method advised by Matson, and the ingenious larger thoracoscope devised by Bethune, which allows clips to be applied to the adhesions before severing them. One may state, however, that the cost of the electro-coagulation machine is prohibitive at present, and the actual cautery proves very satisfactory as one grows more experienced and adept in its use.

For the sake of those who are entirely un-

familiar with this technique, one may state briefly that the thoracoscope is usually introduced through the sixth interspace just posterior to the angle of the scapula. The interior of the chest is examined, and if adhesions suitable for division are found, the cautery is introduced in a suitable location in front—usually the third interspace near the anterior axillary line. The adhesions are then divided very slowly, so that all blood vessels may be coagulated before cutting, and as close to the chest wall as possible, so as to keep away from lung tissue. A local anæsthetic of one-half per cent novocaine is used. Drowsiness is produced by pre-operative medication with nembutal and morphine sulphate, and very little pain is experienced by the patients. The cases must be selected carefully, and one soon learns that the appearance of the adhesions in stereoscopic x-rays may be very different to their actual extent and outline as seen through the thoracoscope.

The operation may be a long and tedious procedure if the adhesions are extensive, but as more skill has been acquired the author has been agreeably surprised at the extent of adhesions that can be divided satisfactorily by this method. It seems important that the adhesions be well "cooked", with the cautery just glowing, and divided very close to their distal ends—particularly those that are broad and have an extensive attachment to the chest wall. In this way the danger of hæmorrhage and of injury to the lung is minimized.

In the following reports only pulmonary tuberculosis is considered. Some of the patients had tuberculosis or other diseases elsewhere in the body, but for the sake of brevity these cases will be omitted.

CASE 1

M.F., female, aged 22, was admitted to the Mountain Sanatorium, Hamilton, on January 12, 1931. Bilateral pulmonary tuberculosis. Sputum, one drachm daily before pneumolysis; positive for tubercle bacilli. Pneumothorax was initiated on May 1, 1931, but was unsatisfactory because of pleural adhesions. Fluid appeared in the left pleural cavity in September, 1931, extending to the level of the fourth rib. By November, 1931, the fluid was cloudy and positive for tubercle bacilli. Temperature 99°. An x-ray on February 8, 1932, showed fluid in the left pleural cavity to the level of the third interspace. Above this level the lung was incompletely collapsed by pneumothorax. A cavity near the hilum and opposite the second rib was held open by adhesions, one of which passed laterally to the fourth rib, and two of which passed upward to the chest wall above the first rib.

Pneumolysis on February 10, 1932.—Three adhesions were visualized as in the x-ray and were divided. The lower adhesion was firm and fibrous and cut with difficulty. After operation there was no increase of fluid. By April 12, 1932, there was a scant amount only in the costo-phrenic angle; no cough; no sputum; temperature, normal. An x-ray on October 13, 1932, showed the pneumothorax to be complete. The stumps of the adhesions could be seen protruding from the lung. A small amount of fluid was present. The sputum was negative. (Figs. 1 and 2).

CASE 2

W.R., male, aged 34, was admitted to the Hamilton Sanatorium on January 30, 1930, with moderately advanced active tuberculosis affecting chiefly the left upper lung field. Cavitation became apparent, so pneumothorax was initiated on May 14, 1931. Sputum, one ounce daily and positive for tubercle bacilli 17 times in 22 tests. An x-ray on February 15, 1932, showed a pneumothorax on the left side. There was a pear-shaped cavity near the hilum and opposite the second rib. From the apex of the cavity a stout adhesion passed upward and outward to the chest wall. A second smaller adhesion was seen paralleling the first and lying ½ inch below it. No evidence of pleural fluid.

Pneumolysis on February 17, 1932.—The two adhesions described were located and severed without difficulty. A third, slender, apical adhesion, not seen in the x-ray, was also cut. After operation fluid appeared to the level of the fifth rib, but by March 29, 1932, had entirely disappeared. The sputum decreased and became thin. It has been negative 8 out of 10 times and constantly negative (5 tests) since April 7, 1932. X-ray on March 29, 1932, showed the cavity to be much smaller, but there was some herniation of the lung to the opposite side. No pleural fluid. Pressure in the pneumothorax was slightly decreased, and x-ray on July 25, 1932, showed no herniation, and the cavity no longer visible; the sputum was now negative. (Figs. 3 and 4).

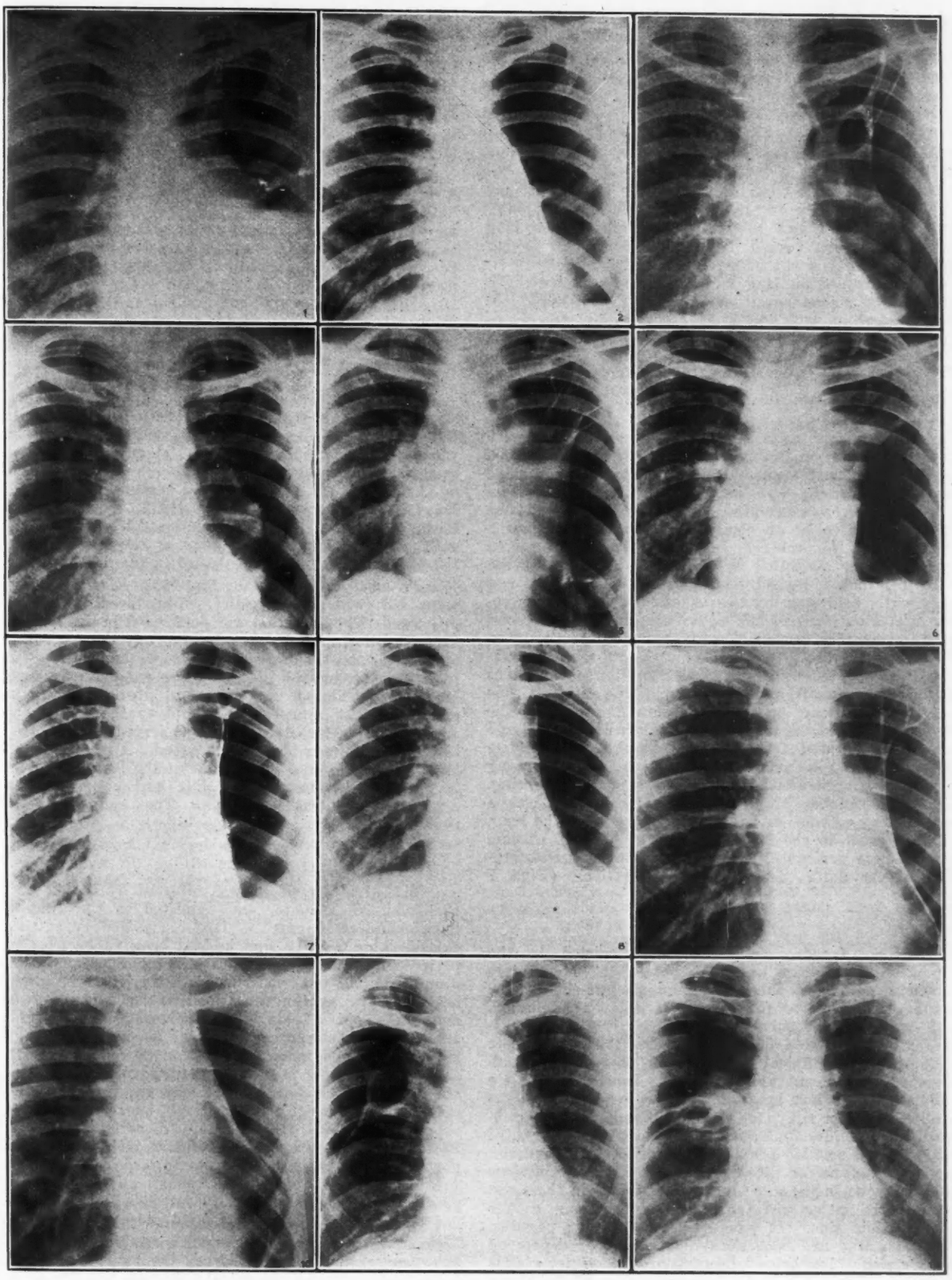
CASE 3

M.D., female, aged 27, was admitted to the Hamilton Sanatorium on July 13, 1931, with far-advanced active pulmonary tuberculosis. Pneumothorax was initiated on the left side on July 20, 1931. Sputum, about two ounces daily and positive for tubercle bacilli. An x-ray on February 23, 1932, showed an incomplete pneumothorax on the left side, with two large cavities in the upper part of the lung. By stereoscopic plates one cavity appeared to be in the apex of each lobe and each cavity had a fluid level in it. This area of the lung appeared to be attached to the chest wall by several small adhesions. There was also a broad adhesion passing from the lower portion of the lung downward and outward toward the costo-phrenic angle.

Pneumolysis on February 24, 1932.—The upper portion of the lung was found to be attached to the chest wall by a large irregular adhesion which crossed several ribs. The folded edges apparently gave the stereoscopic appearance of several small bands. Lower down there was one slender adhesion and another thick one with an extensive attachment to the chest wall. The lower two adhesions were divided close to the chest wall. The procedure was so long and tedious that the upper attachment was left for another time. X-ray on May 20, 1932, showed much better collapse of the lower part of the lung. A small amount of pleural fluid was present. The sputum remains positive. (Figs. 5 and 6).

CASE 4

J.S., female, aged 23, was admitted to the Hamilton Sanatorium on May 10, 1929, with moderately advanced pulmonary tuberculosis with cavitation in the right apex. The sputum was positive for tubercle bacilli on admission but negative since February, 1930. Pneumothorax was initiated on the left side on August 5, 1931, because of recent extension of disease on that side. An x-ray on February 12, 1932, showed a partial pneumothorax. One adhesion passed laterally in the third interspace. The upper portion of the lung appeared to be adherent in the apex.



Pneumolysis on February 24, 1932.—Two adhesions were found. One, passing laterally to the fourth rib, was easily cut. A fan-shaped adhesion at the apex could be only partially divided. X-ray on August 29, 1932, showed pneumothorax to be more complete. The diseased area was fairly well compressed, although the lung was still adherent at the apex. The sputum remains negative.

CASE 5

M.E., female, aged 19, was admitted to the Hamilton Sanatorium on October 26, 1931, with far-advanced pulmonary tuberculosis. The sputum was positive for tubercle bacilli once out of six times. Initial pneumothorax on January 11, 1932. X-ray on May 10, 1932, showed pneumothorax to be about complete. One long slender adhesion passed from near the hilum to the region of the first rib. No pleural fluid.

Pneumolysis on May 11, 1932.—One adhesion about the size of a lead pencil was found. It was separated from the chest wall and when cut retracted quickly as if under tension. X-ray on September 6, 1932, showed a satisfactory collapse. No pleural fluid. The sputum remains negative.

CASE 6

R.F., female, aged 17, was admitted to the Hamilton Sanatorium on October 29, 1929, with far-advanced active pulmonary tuberculosis. Cavitation developed while the patient was on complete rest. Therefore pneumothorax was initiated on March 7, 1930, but was incomplete because of pleural adhesions. The sputum was positive for tubercle bacilli in ten out of eleven examinations. X-ray on April 4, 1932, showed a cavity, 1 by 1¼ inches, opposite the first interspace. This was apparently held open by two adhesions—one passing upward and outward to the upper margin of the second rib, and another passing directly upward into the apex. Fluid was present to the level of the sixth rib.

Pneumolysis on May 18, 1932.—Three adhesions were cut, a small one in the mid-lung field, a fine one and a broad one passing into the apex. The two small adhesions were easily dealt with. The large one was separated from the chest wall for about two inches, leaving a narrow continuation of it running medially which it seemed inadvisable to attempt cutting. X-ray on October 17, 1932, showed that there was a satisfactory collapse of the diseased portion of the lung. Fluid present to the level of the fifth rib. A phrenic exeresis was performed in an attempt to hasten absorption of the fluid. The sputum is negative. (Figs. 7 and 8).

CASE 7

F.E.S., female, aged 21, was admitted to the Hamilton Sanatorium on October 6, 1932. Moderately advanced pulmonary tuberculosis, mainly left sided. The sputum was positive for tubercle bacilli on admission, but constantly negative since March, 1931. Pneumothorax was initiated on February 18, 1931. Complete collapse of the apical portion was prevented by adhesions. X-ray on April 5, 1932, showed incomplete collapse of the left lung. There was cavitation at the level of the first rib. One slender adhesion passed backward in the mid-scapular region to the level of the third rib. Several smaller adhesions passed to the second rib.

Pneumolysis on May 25, 1932.—Three adhesions were cut, one in the mid-lung field and two in the apex. One of the latter was fan-shaped and without a free edge on one side. It was divided as far as possible. X-ray on May 28, 1932, showed an improved degree of compression. The areas of rarefaction were not visible and the adhesions had disappeared. Pleural fluid was present to the level of the fifth rib. On August 18, no pleural fluid was shown by x-ray. The patient was discharged with pneumothorax on August 21, 1932. Sputum, negative.

CASE 8

E.B., male, aged 31, was admitted to the Hamilton Sanatorium on May 21, 1932. He had been previously treated there from November 22, 1926, to July 6, 1931. Pneumothorax was initiated on March 14, 1930, and refills were kept up while the patient was at home. The sputum became negative for tubercle bacilli during his first admission. During the few weeks previous to present admission his sputum increased to half an ounce daily and became positive. X-ray on February 12, 1932, showed a large apical cavity held open by adhesions. One broad band passed postero-laterally and a smaller one passed forward in the first interspace. There was a small amount of pleural fluid.

Pneumolysis on June 1, 1932.—Two adhesions at the apex were cut. One was slender; the other was fan-shaped and was divided as far as possible. Toward the base the lung was attached to the chest wall by a thin filmy adhesion, which was divided. An x-ray on August 29, 1932, showed no visible adhesions and the cavity was collapsed. No pleural fluid was present. Sputum is negative. (Figs. 9 and 10).

CASE 9

M.F., female, aged 27, was admitted to the Hamilton Sanatorium on August 15, 1931, with moderately advanced pulmonary tuberculosis, chiefly affecting the upper half of the left lung. Pneumothorax was initiated on August 8, 1931, and phrenic exeresis on September 16, 1931. X-ray on June 14, 1932, showed pneumothorax on the left side with fairly satisfactory collapse. The lung was adherent at the apex, with two slender adhesions passing outward in the first interspace.

Pneumolysis on June 15, 1932.—Four adhesions were cut without difficulty. No bleeding was encountered. The operation was performed in the Hamilton City Hospital, and on the following day the patient was transferred to the Sanatorium in an ambulance. The second day after the operation she complained of pain in the left side of her chest and of not feeling well generally. An x-ray showed fluid to the level of the fourth rib. This fluid when aspirated proved to be blood. No further bleeding occurred. X-ray on September 27, 1932, showed the shadow at the base to be clearing. No adhesions were visible and collapse of the diseased area was complete. The sputum remains negative.

CASE 10

W.B., male, aged 36, was referred by Dr. A. H. W. Caulfeild, of Toronto, and admitted to the Hamilton Sanatorium on August 10, 1932. The history of tuberculosis dates to 1918, and he had been under treatment periodically since that time. Pneumothorax was initiated June 1, 1932, but was unsatisfactory because of adhesions. The sputum was positive for tubercle bacilli five times out of six during present admission and amounted to two drachms daily. An x-ray on August 25, 1932, showed incomplete pneumothorax on the right side. In the upper portion of the lung field was a cavity about 1 by 1½ inches. This cavity appeared to be held open by adhesions to the chest wall, one from its lateral aspect to the third rib, and one or more from the top of the cavity to the region of the first rib. The inferior portion of the lower lobe moved towards the chest wall just above the diaphragm as though an adhesion were present there but not distinctly outlined.

Pneumolysis on September 6, 1932.—Seven adhesions were divided—two slender ones running laterally; two slender ones running toward the base; two passing to the apex. One of the apical adhesions was fan-shaped and only partially divided. An x-ray in November, 1932, showed cavity to be much smaller. X-rays at intervals showed it to be gradually closing. The sputum remains positive. (Figs. 11 and 12).

CASE 11

M.J., female, aged 38, was admitted to the Hamilton Sanatorium on January 29, 1932, with moderately advanced active pulmonary tuberculosis. The sputum was positive for tubercle bacilli 6 out of 7 times. Cavitation occurred in the left apex. Pneumothorax was initiated on February 17, 1932, but was incomplete because of adhesions. An x-ray on June 22, 1932, showed cavities in the apex apparently held open by a triangular-shaped adhesion passing to the first rib. No evidence of pleural fluid.

Pneumolysis on September 14, 1932.—One stout adhesion was found. It was mostly divided, but a narrow prolongation which was continuous with the mediastinum was left. By x-ray on November 14, 1932, the stump of the adhesion was visible and retracted toward the hilum, allowing more efficient collapse of the diseased portion of the lung. The sputum remains positive.

CASE 12

J.K., male, aged 23, was admitted to the Hamilton Sanatorium on July 13, 1927, with far-advanced active pulmonary tuberculosis with cavitation in the right apex. Pneumothorax was initiated August 3, 1927. The sputum was positive for tubercle bacilli on admission, but constantly negative since October, 1928. He had had clear fluid in pleural cavity from July, 1929, to April, 1932. An x-ray on April 11, 1932, showed an incomplete pneumothorax. The upper portion of the lung was held to the chest wall by several adhesions. There was a small amount of fluid in the costo-phrenic angle.

Pneumolysis on September 14, 1932.—Several small adhesions and two fairly stout ones were found. About seven in all were cut without difficulty. An x-ray on September 20, 1932, showed much better collapse of the lung. The amount of fluid present had increased. The sputum remains negative.

CASE 13

T.L., female, aged 21, was admitted to the Hamilton Sanatorium on May 13, 1931, with moderately advanced tuberculosis in the right upper lobe. The sputum measured one and one-half ounces daily and was positive for tubercle bacilli 6 times out of 9. The lesions progressed to cavity formation. Pneumothorax was initiated on August 31, 1931. Upper lobe compression was inadequate because of adhesions. An x-ray on May 26, 1932, showed a cavity present opposite the first interspace, and from it two adhesions passing to the chest wall, one between the first and second ribs and one just above the first rib.

Pneumolysis on September 14, 1932.—Three adhesions were found. Two were slender and easily divided. The third was fan-shaped, having one edge free and the other continuous with the mediastinum. The greater portion of this adhesion was divided. X-ray on November 14, showed satisfactory collapse of the diseased area. The sputum is negative.

CASE 14

W.M., male, aged 32, was admitted to the Hamilton Sanatorium on April 26, 1932, with far-advanced pulmonary tuberculosis, chiefly confined to the right upper lobe. The sputum measured one-half drachm daily and was constantly positive for tubercle bacilli. Initial pneumothorax on August 2, 1932. An x-ray on September 7, 1932, showed an uncollapsed cavity, 1½ by 1 inch, in the upper lobe. From the upper portion of this lobe a fairly broad adhesion ran into the apex.

Pneumolysis on November 8, 1932.—One large adhesion was found and divided quite easily. It was cut very close to the chest wall and appeared to be about ¾ inch thick and 1½ inches broad. X-ray on November 15, 1932, adhesions were not visible. The cavity was much smaller. Collapse of the lower lobe was improved. The sputum remains positive.

SUMMARY AND CONCLUSIONS

1. Hæmorrhage occurred in 1 of the 14 patients. It was not severe enough to be alarming, but it may institute a pleurisy and obliterate the pneumothorax.

2. Infection of the pleural cavity did not occur in any patient.

3. Ten of the 14 patients have a negative sputum at the time of this report. Only 5 were negative before pneumolysis.

4. Division of the adhesions would appear to have a beneficial effect on pleural effusions after the initial reaction has subsided.

5. Thoracoplasty would have been necessary in many of these patients if pneumolysis had not been available.

6. Intra-pleural pneumolysis is of definite value in the treatment of certain cases of pulmonary tuberculosis.

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2. BARNES AND BARNES, *Am. Rev. Tuber.*, 1929, **18**: 412. (Quoted by Bethune).
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ASCHHEIM-ZONDEK REACTION IN CHORION-EPITHELIOMA.—M. Daveo (*Bull. Soc. d'Obstét. et de Gynécol. de Paris*, February, 1933, p. 215) illustrates by a case the great value of the Aschheim-Zondek reaction in complications following a mole, where histopathological examinations of the debris of curettage are often inadequate for a precocious diagnosis. The patient, aged 48 years, sought advice for troubles which she attributed to the menopause. Until four months previously menses had been regular and normal. Clinical examinations revealed a softened cervix and a globular but very soft uterus. Twenty days later the patient had a severe hæmorrhage and, when seen, was in labour. A complete mole was expelled. The uterine cavity was immediately explored, and a careful curettage made. Recovery was afebrile and the patient was up on the twelfth day, although the uterus appeared slightly subinvoluted. Five weeks after the expulsion of the mole the patient reported a loss of blood. On examination the uterus was found to be slightly enlarged and rather soft. A catheter specimen was immediately taken for an Aschheim-Zondek test. This was made according to Brouha's technique and was found to be strongly positive. A hysterectomy performed several days later confirmed the diagnosis of chorion-epithelioma. A small tumour the size of a grain of maize was found in an angle of the uterus. The patient made a good recovery. —*Brit. M. J.*, 1933, **2**: Ep. 8.

THE RESUSCITATION OF NEWLY-BORN BABIES SHOWING NARCOSIS*

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A FAIR proportion of newly-born babies show signs variously described as asphyxia, narcosis, and anærosis. One may briefly classify this phenomenon for purposes of discussion into asphyxia pallida and asphyxia livida. Into this latter group fall most of the cases of narcosis due to the use of morphine during labour. We would like to emphasize that "asphyxia" is a poor term for the phenomenon usually discussed under that name. Shock from trauma, interference with the fetal circulation *in utero* or during delivery, and obstruction of the respiratory tract by aspirated débris, are the most frequent causes of "asphyxia."

"Asphyxia pallida" is a condition most commonly due to difficult labour or traumatic delivery. It is characterized by marked pallor, limpness, slow or irregular heart-beat, feeble or absent respiration, feeble or absent reflexes. The pallor is most marked about the mouth, although the lips remain bluish or cyanotic. The pupils are dilated widely and the cornea looks somewhat dull and glazed. The child is cold and clammy to the touch and pressure marks on the skin do not disappear readily. It responds poorly, if at all, to any kind of stimulation. The great majority of fatal cases at autopsy show intracranial damage, such as hæmorrhage or dural lacerations. Because of the underlying grave pathological condition, resuscitation is usually difficult and ineffective.

"Asphyxia livida" babies offer a much better prognosis. They are bluish or purplish in colour and pressure marks on the skin soon disappear. They usually are not limp and frequently move their extremities spontaneously on stimulation. The muscle tonus is good and the reflexes are all present. The heart-beat is slow but often quite vigorous. The respirations are absent or shallow. The pupils are dilated considerably, but not so widely as in the cases discussed above, and the eyes do not have the same "fishy" appearance. The child is warmer and usually responds fairly well to patient efforts at resuscitation.

Morphine narcosis in babies is of the latter type, and is frequently very difficult to differentiate from asphyxia due purely to trauma, to maternal toxæmia, or to other causes. The child usually takes a preliminary breath or a series of breaths before relapsing into apnœa. It is bluer than in the usual case of asphyxia livida, and has a much better circulation, as evinced by its reaction to pressure marks and stronger heart-beats. The pupils are dilated moderately, but on resuscitation contract almost at once to small or pin-point size. The child moves spontaneously, but responds poorly in most cases to cutaneous stimulation. In other words, stimulate him and he becomes apnœic and more cyanotic. His reflexes are active, and he responds to gas-resuscitation, as described below, in a way that is almost pathognomonic for the condition.

FIG. 1.—Tracheal catheter, with glass trap to catch aspirated débris. The trap is not essential.

Mechanical obstruction to respiration is the most common etiological factor in the production of neonatal asphyxia. The child may take into its mouth mucus, blood, vernix, or liquor amnii, with which it comes in contact in its passage through the vagina. It may gasp prematurely or immediately after delivery, and these first inspiratory efforts pull this foreign material into the trachea and larger bronchi. Breech delivery and version and extraction particularly predispose to these premature inspiratory efforts and the aspiration of vaginal mucus and blood. Prophylactically, one should attempt to clear the pharynx before the initial respiratory efforts. This can be done with the gloved finger, with or without the aid of a soft piece of gauze, always being careful not to abrade the delicate mucous

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membrane. Gently milking out the oro-pharynx can be resorted to likewise.

The most effective method for clearing the air passages easily is the tracheal catheter (Fig. 1). With the catheter in place, the chest may be gently and rhythmically compressed to stimulate respiration. Violent movements are apt to be harmful.

In many cases we insufflate through the catheter, using minimal pressures, and force in the air only by means of the operator's cheeks and not with his chest expiration. Care must be taken to avoid rupturing the delicate alveoli of the lung in this procedure. Warmth is as necessary to these newborn babies as to any patient in shock. Alpha-lobelin, injected intramuscularly, has been advocated widely.

There are a number of mechanical contrivances on the market to provide for artificial respiration. Several of these have been adapted for use on the newly-born. The Drinker apparatus is the best known, and its principle is the employment of alternating positive and negative pressures which cause the chest to expand and relax. It may be useful in treating prolonged cases of asphyxia, but it is not indispensable.

OBSERVATIONS

As this work was incidental to a study on the effects of morphine in labour, to be published elsewhere,[39] there is no need to discuss at length the etiological factors responsible for such narcosis. Suffice it to say that contributory factors in its production are maternal toxæmia, delivery trauma, and interference with the fetal circulation, as evinced by failing fetal heart-tones. Moreover, the drug has its maximum effect on the fetus if a period of 1 to 6 hours elapses between its administration and the time of birth. Unusually marked reaction of the mother to the drug also predisposes to narcosis in the newborn. The weight of the child seems largely irrelevant. Deliveries under local anæsthesia or by Cæsarean section show a very low incidence of such narcosis.

The present study is confined to methods of resuscitation of the newly-born presenting signs of morphine narcosis. Throughout the year 1932 we have observed a series of 320 infants delivered after the administration of morphine to the mother, of whom 120 showed some degree of narcosis. Twenty-five of the 120 showed deep narcosis. Some 36 babies were resuscitated with carbon dioxide or oxygen or mixtures of the two gases in varying proportions. In 84 babies no gases were used for resuscitation.

Six of these babies were apnœic for over twenty minutes, and one did not have normal respiration for thirty-five minutes. It is of interest that Murphy and Coyne[1] reported the case of a child who was apnœic for sixty-four minutes. All of our 6 children lived and seemed healthy afterward; only one of the 6 had gas resuscitation.

Of the 84 babies resuscitated without the use of gases 8 died. Two of the 36 resuscitated with gases died. In other words, our series of 120 babies showed an uncorrected mortality of 10 babies, or 8.5 per cent. Corrected by excluding premature infants weighing less than 2,500 grams, the mortality proves to be 4.3 per cent. The fetal mortality of the new Chicago Lying-in Hospital from July 1, 1931, to April 1, 1933,

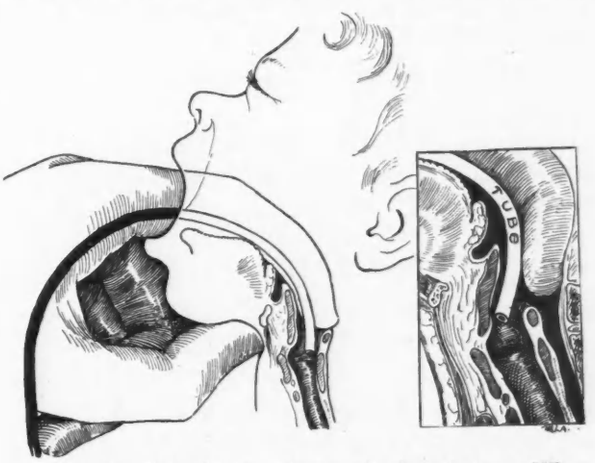

FIG. 2.—Introducing the tracheal catheter. When the tip of the catheter comes to lie above the arytenoid cartilages the finger gives it a sharp bend forward under the epiglottis and then a push brings it into the rima (DeLee).

is 4.4 per cent for 4,730 births. In 20 of these there is no record of weight, but of the remainder the mortality among infants weighing 2,500 grams or more was 2.0 per cent. However, our series comprised an unusual number of operative deliveries, primiparæ, and toxæmias, because we were especially interested in the effects of morphia upon such deliveries. Consequently, we feel that our series of babies showing narcosis did not have a real increase in mortality.

The methods which we found best were those involving minimal handling of the child. It was a common observation to see a child delivered,

cry at once, display a healthy red colour, and then when rubbed clean subside into apnœa. We, therefore, handled these infants very little, clearing out the oro-pharynx at once with the gloved finger only or the tracheal catheter. On rare occasions we introduced the latter as far down as the larynx (Fig. 2). The child was then kept warm with clothing and hot water bottles, while the chest was slowly and rhythmically compressed and relaxed some 15 or 20 times per minute. We found that slapping the children or other methods of cutaneous stimulation defeated rather than aided our purpose. It requires courage to stand by, minute after minute, waiting until the child begins to breathe, but it is good therapy, as these results and our experience in many other unrecorded cases demonstrate. When the child is ready it will breathe. However, one has many anxious moments while waiting for oligopnœic babies to regain normality, and in the hope of bettering the situation, if possible, we began some work on resuscitation of such babies, in the light of the vast literature that has accumulated on the subject.

We used gases for resuscitating 36 of our 120 infants showing narcosis; of these 36, 7 had very severe narcosis. Some interesting facts are indicated by our experience with this small group. We found that no one mixture of carbon dioxide and oxygen nor either pure gas alone was ideal for all cases of newborn narcosis. We used, in our experiments, pure carbon dioxide alone, pure oxygen alone, 5 per cent carbon dioxide with oxygen, 10 per cent carbon dioxide with oxygen, and 30 per cent carbon dioxide with oxygen. Many authors comment on the lethal effects of pure carbon dioxide on animals and man, and, of course, when administered over considerable periods of time it is lethal. For that reason we hesitate to recommend it for general use. However, we are convinced that the best method of using these gases for resuscitation is to administer pure carbon dioxide through a tightly fitting face mask for three or four gasps. If none occur, then the carbon dioxide should be given for two or three minutes, with rhythmical chest compression. This should be followed at once by pure oxygen until respirations are regular and have been established for one minute and no longer.

We have used the above method for three cases of deep narcosis and 11 cases of a more moderate type, with astounding results.* We finally came to the point where we felt sure that the air passages of the child had been inadequately cleared if it did not respond in from one to three minutes of such treatment. Repeating the oro-pharyngeal or tracheal toilet at once, we immediately found sequence of pure gases to be successful again. No mixture of the gases used was nearly so effective, but the 30 per cent carbon dioxide mixture was preferable to the 10 per cent, especially if followed by pure oxygen for a brief period; the 10 per cent was correspondingly more effective than the 5 per cent mixture. Indeed, the latter was about as helpful as pure oxygen alone, or very little better. Probably its efficacy is due to the oxygen in the mixture. In our very mild cases of narcosis 5 per cent carbon dioxide or pure oxygen alone helped, but if pure oxygen was continued for any length of time it tended to produce shallow respirations or even apnœa. In 5 cases in which we gave oxygen alone, we had to stop and follow it with pure carbon dioxide and pure oxygen in sequence. We used pure carbon dioxide alone in one mild case. It seems to have no place by itself in resuscitation methods.

DISCUSSION

Since Henderson and Haggard,[2] in 1910, began urging the use of mixtures of carbon dioxide and oxygen in the resuscitation of infants, many reports of the efficacy of such therapy have appeared, interlarded, of course, with criticisms of one kind or another. They originally proposed 5 per cent carbon dioxide plus 95 per cent oxygen, and adhered to that for many years. Later, Henderson[3] advised 7 per cent carbon dioxide for the average case, and 10 per cent for skilled use, together with gentle chest compression. However, in 1925 the experience of others had convinced him that a mixture as high as 25 per cent carbon dioxide may be used to good effect. Peiper and Cammann[12] obtained the following variable results. In using pure oxygen on two occasions the babies were apnœic for fifteen seconds, in another infant the respirations were shallow, and in the rest there was no reaction at all. Giving pure carbon dioxide for a minute was useless in 9 cases and helped slightly in 6. Five per cent carbon dioxide was useless in 13 of 18

* Since this paper went to press we have used this method in many more cases with the same success.

cases in which it was tried, and exceptionally produced apnœa of 17 to 42 seconds. They state that the good effect of 5 per cent carbon dioxide where it occurs is due to the 95 per cent oxygen, and point out how variable and uncertain is the reaction of the respiratory centre to carbon dioxide.

Murphy, Wilson and Bowman,[17] and Murphy and Sessums[18] recommend the Drinker respirator highly, but the former authors admit that it must be used within 5 minutes of birth or less to be of use, and of their 34 cases, only 20 survived. Of the 14 babies who died, eight were autopsied and had findings quite sufficient to explain their deaths. Murphy and Sessums found that the respirator increased the frequency and vigour of spontaneous respirations already established. Of 21 apnœic infants on whom it was used, 14 per cent went home alive. Sixty-seven per cent of 22 gasping infants survived, and where poor respiration was present, 53 per cent survived. Operative cases had a higher incidence than others, and these authors state that the respirator is best for narcosis and prematurity. However, the figures published are not very flattering to the apparatus which they recommend, even admitting that their cases were much more serious than those of our larger series.

There is, both from a practical and theoretical point of view, excellent evidence that carbon dioxide is a physiological respiratory stimulant. Leake and Waters[22] found that pure carbon dioxide produced respiratory stimulation at first, later respiratory depression, and that oxygen then resuscitated the patient promptly.

Hill and Flack[23] quote a good deal of the controversial experimental literature. They found that amounts of carbon dioxide between 6 and 35 per cent excited respiration almost immediately, but higher concentrations depressed respiration. Waters and Harris[9] gave increasing amounts of carbon dioxide to a dog until the concentration was over 80 per cent, and respiration stopped. A single inflation with oxygen then restored breathing. They believe that the hyperpnœa of labour depletes the maternal blood of carbon dioxide, but the fetus is in a state of anoxæmia, and even respiratory depressants administered during labour fail to keep the carbon dioxide up to the normal level. Dressler[10] states that higher carbon dioxide concentrations lead to more rapid lung ventilation and hence their maximum beneficial effect is attained sooner.

Schmidt[25] came to the following conclusions. Acute cerebral anæmia produces vasodilatation, but so long as the cerebral circulation is adequate carbon dioxide inhalation in concentrations of as high as 80 per cent is always a respiratory stimulant. No dangerous tissue changes occur if the circulation is improved before such a stimulant is given, and, of course, at delivery such circulatory improvement occurs. The vasodilatation in cerebral anæmia markedly diminishes the irritability of the respiratory centre. The mechanism of respiratory response is governed by the change in flow itself rather than the new levels of flow maintained. For example, blood adequate for quiet breathing will produce apnœa when perfused through the cerebral vessels just after a period of acute anæmia, such as occurs in labour. The stimulation produced by carbon dioxide inhalation is minimized by an antagonism between blood stimuli and cerebral vascular changes, and marked responses can occur only when blood changes develop which are possibly detrimental to the body as a whole. Morphine dilates the cerebral vessels, so the stimulating effect shown occasionally by oxygen may be due to a counteraction of this vascular effect. Gesell[27] has also written extensively on this subject.

Henderson and Haggard, in work on dogs, showed how a high tension of carbon dioxide produced a depression of the respiratory centre if a dog were exposed to it for long; then apnœa occurred when the animal was transferred to normal air. The respiratory centre had become accustomed to a high level of carbon dioxide.

Eastman[29] showed that the fetus *in utero* is supplied with blood 63 per cent saturated with oxygen, but at birth this falls to 50 per cent. In fact, at birth the umbilical artery blood is almost free of oxygen and the mean capillary unsaturation is two or three times that of the adult blood. Probably the newborn infant has no oxygen want because of its efficient utilization of what oxygen it has, although he believes that normal babies often have an oxygen tension near the lower limits compatible with life. He admits that the relatively very high carbon dioxide of fetal blood *in utero* is difficult to reconcile with intra-uterine fetal apnœa, and so assumes that the excitability of the respiratory centre *in*

utero is "markedly depressed" to carbon dioxide.

Henderson and Radloff[32] state that in asphyxiated newborn infants lactic acid displaces carbon dioxide from the blood bicarbonate and produces acapnia; hence, carbon dioxide is needed for resuscitation.

We feel that the dangers incurred by using pure carbon dioxide are not as great as have been considered by other authors. We had no mortality with its use, as we remarked above, and saw no effects which could be construed as harmful in any sense. Few of the children were given more than two or three gasps of the pure carbon dioxide, but it was administered for as long as 4 or even 5 minutes to others. The reaction to oxygen was much more rapid and striking when preceded by the carbon dioxide.

We can explain our results with pure carbon dioxide followed by oxygen, or mixtures of carbon dioxide in oxygen very high in carbon dioxide, by a reference to the above considerations. The child *in utero* is relatively anoxæmic and acapneic after the hyperpnœa of labour; the respiratory centres are anæmic; there is cerebral vasodilatation, such as we always see at autopsy, with depression of the respiratory centre. At birth the cerebral blood flow quickens and there is accordingly an impulse toward apnœa. Morphia tends to increase the cerebrovascular dilatation, increases the fetal carbon dioxide tension by limiting maternal ventilation, and thus raises the carbon dioxide threshold of the respiratory centre. There is a certain antagonism between some of these changes, so the outcome is fairly variable. Probably many infants are affected so seriously by intra-uterine conditions and birth itself that morphine is all that is needed to produce a definite "asphyxia," but one must ascribe the "narcosis" in such cases to mechanical rather than chemical factors. If apnœa supervenes at birth, as it is apt to do if maternal ventilation has been very poor or the fetal cerebral anæmia is marked or labour has been violent, then a high carbon dioxide concentration introduced into the blood will stimulate the depressed respiratory centre. The stronger concentrations act most rapidly, of course. Once this efficient stimulus has been given for a short period of time, the system demands oxygen to compensate for its long anoxæmia and acidosis. Dr. Adair has suggested to us that possibly an important feature in such gas resuscitation is that it mechanically opens the alveoli when combined with chest manipulation, and provides accessible oxygen where the weakest inspirations can secure it.

We used the simplest apparatus in our work in order to make it easily applicable, clinically, under all conditions—in the home or in the hospital. One needs merely a small portable tank of each of the pure gases or any carbon dioxide-oxygen mixture preferred, connected to a rubber mask to fit tightly over the child's face. Anything more is superfluous. If one is careful to adjust the flow before putting the mask to the face the child cannot be harmed. With such cheap and simple apparatus, we believe narcotized babies can be promptly and safely resuscitated, and morphine can therefore be used to much greater advantage for women in labour. We believe the best gases to use are pure carbon dioxide, followed by pure oxygen, but in the hands of unskilled and occasional obstetricians, probably from 10 to 30 per cent carbon dioxide mixtures, followed by oxygen or not, are preferable. We cannot recommend them too heartily in cases of morphine narcosis of the newly-born.

SUMMARY

Narcosis in babies, due to morphia used during labour, may be differentiated from other types of "asphyxia" of the newly-born. The term "asphyxia" is really a misnomer, for under it we carelessly group babies suffering from such conditions as post-operative shock and respiratory obstruction due to aspiration, to mention only a few.

Commonly used methods of resuscitation are discussed briefly.

Our experiences with a group of 120 newly-born infants showing narcosis are described. Thirty-six cases in the group were resuscitated by means of various mixtures of carbon dioxide and oxygen, but we found pure carbon dioxide followed by pure oxygen, for very short periods of time, much the best means at our disposal. For general clinical use we would recommend a 10 to 30 per cent mixture of carbon dioxide in oxygen, to be followed by pure oxygen. This mixture is not dangerous if used intelligently. It requires only very simple equipment. It should be emphasized that such gases as are used

should not be used for longer than is necessary to initiate adequate respiration.

The literature on gas resuscitation and the physiology of respiration in the newly-born are considered briefly.

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PRIMARY CARCINOMA OF THE LUNG IN A CHILD*

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TWO decades ago primary carcinoma of the lung was considered a rare disease. In 1912 Adler[1] collected 374 cases and at that time stated, "On one point however there is nearly a complete consensus of opinion, and that is that primary malignant neoplasms of the lungs are among the rarest forms of disease." Since this time a more thorough study of the literature and the addition of several series of cases do not seem to bear out this statement. In 1916 Scott and Forman[2] added 108 cases, which included 19 cases collected by Weller[3] that had not been mentioned by Adler. They concluded that "the fact that Adler was able to collect only 374 authentic cases of primary carcinoma of the lung from the literature up to 1912, and that at least 120 cases have been reported since, makes it apparent that the condition is much more frequent than earlier statistics would indicate." Ewing[4] states that primary malignant tumours of the lung form about 1 per cent of all cancers. Kaufman[5] places the figure at 1.76 per cent. Brunn[6] found in 382,671 autopsies, between 1872 and 1898, 159 cases of primary pulmonary carcinoma or 0.04 per cent; in 192,271 autopsies, between 1898 and 1916, 488 cases or 0.24 per cent; in 133,308 autopsies, between 1916 and 1924, 71 cases or 0.21 per cent. The trend of opinion at the present seems to be that primary malignant disease of the lung is uncommon but not rare, and that its incidence is increasing.

In practically all of the larger series of cases there is a general agreement regarding sex distribution—that the condition is more frequent in males than in females. Breckwoldt[7] found this to be true in the ratio of 2.8:1; Homann[8] in the ratio of 3:2.

Primary carcinoma of the lung in childhood is undoubtedly extremely rare. In Adler's series the youngest authentic cases were 12 years of age. He reported two cases, both males and both 12 years of age. The McAldowie[9] case of 5½ months was unproved by microscopic examination, and was therefore listed under "doubtful cases" by Adler. Nuscheler[10] refers to a case in a girl aged 7 years. As to age-incidence, Weller says, "While most cases of carcinoma of the lung occur at the cancer age, occasionally cases are seen in the extremities of life and apparently in about the same relative frequency as cancer of the stomach, uterus and breast." The following case is presented because of the rarity of primary lung carcinoma in childhood. We have been unable to find an authentic case in a child as young as this reported in the literature. It also illustrates the fact that metastases may occur very early, as noted by many writers. Allen and Smith,[11] referring to primary lung carcinoma, stated, "In this connection it must be borne in mind that the metastatic tumours not infrequently give rise to symptoms in the new location before the original site is suspected of disease." This is true of this case, the child having been under medical observation practically eleven months before the correct diagnosis was made.

CASE REPORT

P.W., a 16 months old female, was admitted to the Stuyvesant Square Hospital on October 22, 1931.

History of illness.—About six months previously, the child being then ten months old, a small lump was noted in the lumbar region which became gradually larger. It was described as being firm, painless, slightly red and about 2 cm. in diameter. The child was taken to the family physician who excised the tumour and sent

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it to a pathologist for examination. The latter reported adenocarcinoma. After the wound healed, nothing further was observed until a few days before admission when a few small nodules were noted over the scar. The patient was again taken to the family physician who referred the child to this hospital. A pathological slide made from the original lesion was brought by the parents.

The personal and family history contained nothing of importance.

Physical examination.—Examination revealed a well-developed and well-nourished child, the weight being normal for her age. The head and neck showed nothing abnormal, and the special sense organs were healthy. To the right of the mid-line in the lumbar region was an old incisional scar, about 4 cm. in length. Underlying this scar several hard nodules were felt, the largest of these being 5 mm. in diameter. The heart and lungs were normal, and the abdomen showed nothing of note. The external genitalia were negative. Rectal examination under anæsthesia showed no masses present in pelvis or lower abdomen. The reflexes were normal.

Laboratory findings.—Red blood cells, 3,560,000; hæmoglobin, 55 per cent (Sahli); white blood cells, 22,550; polymorphonuclears, 68; lymphocytes, 30. Urine, negative. Wassermann and Kahn tests were negative.

X-ray findings.—Barium enema: the bowel showed no evidence of obstruction or any filling defect. Chest: lung fields normal. The thymus was not enlarged. The long bones showed no evidence of disease.

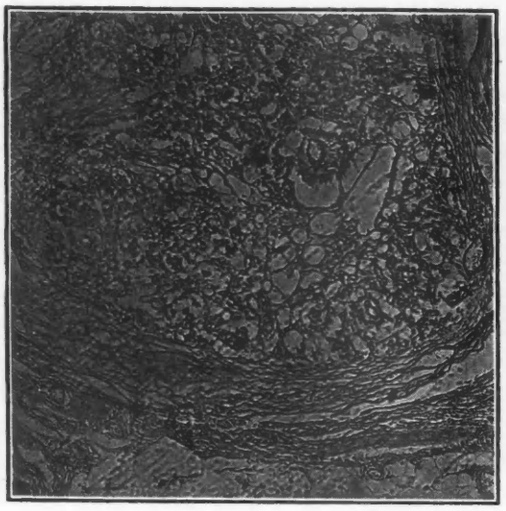
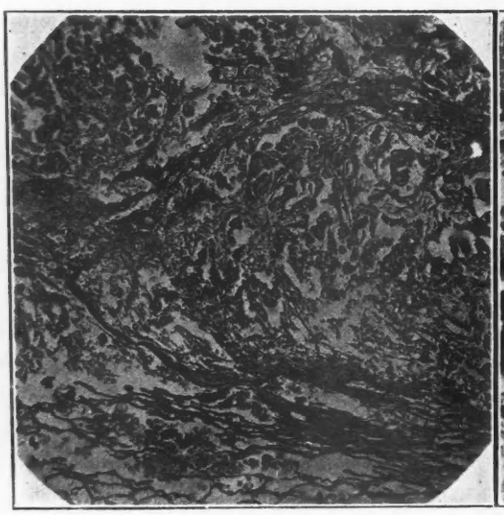


FIG. 1.—A section taken through recurrent lesion of back (low power).

FIG. 2.—Heart and lungs. The left lung was almost entirely replaced by tumour, a considerable portion of which was necrotic and does not appear with the specimen.

Operation.—(October 23, 1931, by Dr. B. B. Benson). A transverse elliptical incision was made about the old scar, excising with it 2.5 to 3 cm. of apparently healthy skin. The incision was carried down to the fascia overlying the muscles. The whole of this elliptical area was removed, and the wound closed with mattress sutures.



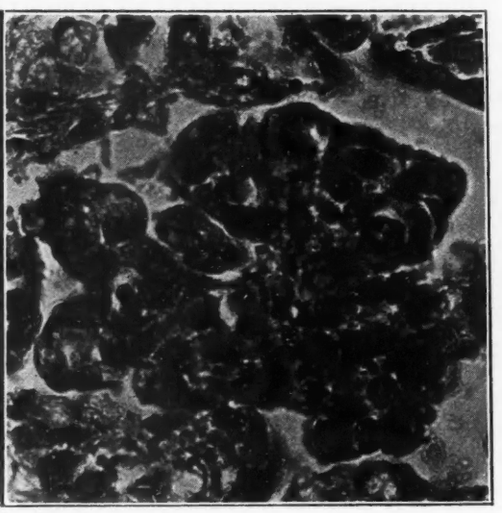


FIG. 3 FIG. 4

Section of lung tumour (low and high power).

Pathological report.—(1) Examination of the original lesion. The tumour was composed of lobules of alveoli which vary in size, some of them large or cystic. They are lined by large cuboidal cells which in places show distension with mucus. Some of these same linings are packed close together, in some areas forming solid cell masses. The supporting stroma shows mucus of basic degeneration. The whole histological picture, taken in conjunction with the location of lesion and age

of patient, suggests a metastasis from some obscure internal carcinoma. (2) Examination of recurrent lesion. Irregular alveoli of varying size are filled or lined by large cells. The growth resembles the original tumour at this site.

Recovery was uneventful and the wound healed normally. The child remained in the hospital 17 days, during which time there was no abnormal elevation of temperature, pulse or respiration. The appetite was good, bowels regular, and the gain in weight was satisfactory.

Up to March 6, 1932, follow-up examinations showed the child to be in good health and free of recurrence. On April 15, 1932, she was brought to the clinic because she had been ill for two weeks following an attack of "influenza." There had been frequent spasms of coughing with scanty expectoration, but no hæmoptysis. Breathing at times was laboured. Two days before this the parents had noted a small lump above the left clavicle.

Examination revealed the child to be critically ill with rapid, shallow, jerky respiration, varying in rate between 30 and 50; pulse 132; temperature 101.2°. A firm mass, about 2.5 cm. in diameter, was present in the left supraclavicular region. There was marked dullness over the entire left chest, with breath sounds diminished in the upper half and absent at the base. Vocal resonance was diminished throughout. The heart sounds were absent on the left side, but heard in the mid-clavicular line in the right chest. Examination was otherwise negative.

X-ray of the chest on April 15, 1932, showed a dense shadow obscuring all details in the left side of the chest. The shadow was of fluid density and might have been caused either by a massive pleuritic effusion or by a massive solid growth in the lung or pleura. X-ray of the long bones, on the same day, showed no evidence of involvement.

The patient was readmitted to the hospital on April 15, 1932, and a left thoracentesis was performed; 300 c.c. of sanguineous fluid was aspirated. No tumour cells could be demonstrated in a microscopic study of smears made from the aspirated fluid. After removing the fluid, the breathing improved, and the child's general appearance showed improvement for three or four days. The left chest became resonant in the upper half, but the base showed practically no change in physical signs and the heart sounds were still heard to the right of the sternum. At frequent intervals severe spasms of coughing occurred, with the expectoration of a small amount of tenacious sputum. The course from this time on was progressively downward. A second thoracentesis was done on April 29th in the hope of relieving somewhat the respiratory embarrassment, but only 5 c.c. of fluid were obtained. The patient died on May 9, 1932.

Autopsy.—(D. S. D. Jessup). A female child, about two years old. A moderate amount of adipose. The abdomen was somewhat distended. In the lumbar region to the right of the spine was an old healed scar.

Heart and pericardium: Just beneath the sternum there was a protruding tumour which lay anterior to the pericardium. The heart was displaced to the right of the median line. The pericardial sac on the left side was adherent to the tumour beneath the sternum.

Right pleural cavity: Normal. The right lung showed congestion but no tumour-involvement.

Left pleural cavity: The whole left pleural cavity was distended by the tumour, the surface of which was adherent to the chest wall. A probe passed down through the left bronchus went through the centre of the tumour-mass, which appeared to have arisen in the left lung and involved all its structures. The new growth was very soft and necrotic, so that much of it was in a fluid condition and remained in the chest cavity after the lung was removed. The structures of the mediastinum showed no tumour invasion.

Thymus: No apparent enlargement.

Liver: The liver extended 8 cm. below the ensiform in the mid-line. Its greatest diameter was 20 cm. and 10 by 5 cm. at the centre. On section, it appeared congested. At the lower edge of the left lobe was a small rounded projection. On section this showed congestion.

The abdominal organs were all carefully examined, but showed nothing abnormal.

Uterus and appendages: There was a small yellow nodule on the left broad ligament. A similar smaller nodule was also present on the right broad ligament. Otherwise negative.

Anatomical diagnosis: Carcinoma of the left lung; congestion of the right lung; Meckel's diverticulum; dilated right ureter.

Microscopical examination.—Lung, left: The tumour of the left lung was composed of large irregular spaces or alveoli filled or lined by large cells. Most of the growth was necrotic.

Lung, right: Congestion.

Heart muscle, mesenteric nodes, liver and spleen were normal.

Kidney: Areas of lymphoid cells, also an area of necrosis (or infarction) on the cortex of the right kidney.

Microscopical diagnosis: Adenocarcinoma of the left lung; infarct of the right kidney.

Note: Owing to a misunderstanding, the left supraclavicular mass was not removed for pathological examination.

SUMMARY

A case of primary carcinoma of the lung in a child is presented, the first metastatic lesion being noted when the patient was ten months old. The occurrence of early metastases is demonstrated, as well as the late development of pulmonary symptoms.

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TREATMENT OF MUMPS BY LEAD.—Martiny (*Bull. Soc. de Thér.*, March 8, 1933, p. 72) remarks that though mumps is usually a mild affection and the effects of treatment are difficult to appreciate, the swelling and pain in the parotid region last on the average four or five days. He had found, however, that the oral administration of minute quantities of metallic lead, triturated in lactose, and placed on the tongue every hour—except during meals and at night—aborts the disease in twenty-four hours and causes rapid disappearance of the pain and swelling. The treatment has no effect on mumps orchitis, but none of the patients who had been treated by lead subsequently developed this complication. The treatment is described as quite harmless.—*Brit. M. J.*, 1933, **1**: Ep. 96.

STERILIZATION OF THE FEEBLE MINDED*

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Toronto

As long ago as 1907, Lord Grey, who was then our Governor-General, stated that "The tendency of the addresses delivered to Canadian Clubs will be to uplift the people out of the valley in which they dwell onto the mountain tops whence their gaze will extend over a wider horizon—to enrich our life by keeping before us high ideals and the well-being of the state." At this very time, as in 1907, the best minds in the world are seeking solution for a grave economic problem which is causing widespread distress. Economic problems seem to be recurrent and at intervals menace the well-being of the state. But there are other problems of at least equal importance that continuously threaten our welfare and I, who am not an economist, have chosen to speak to you this evening about one of the most terrifying of these. It is race degeneration.

That we may all at once realize the importance of the subject, let me begin by quoting from an article entitled "Insanity, the Modern Menace" by Henry Martin Robinson: "If the present rate of increase in mental cases continues for the next three-quarters of a century, half the population of the United States will be in insane asylums and the other half will labour solely to support them." Life and thought here in Canada are much the same as in the United States and if that dire prediction is a sound one, as it seems to be, we cannot expect a happier outcome in our own country unless action is taken to defeat the disintegrating forces which are now at work unhindered.

The medical profession brings us into close, and, I might say, intimate contact with mental defectives, mental diseases of all kinds, and the moral perversions which form such dark blots on the pages of every nation's history. We see the horror, the sorrow which neither word nor act can banish, the physical and mental torment, the grim tragedies which engulf whole families in despair and often ruin. For it is to be remembered that the unfortunate individuals of whom I speak are not *alone*. They have families and friends on whom falls the weight of their suffering.

Since speaking upon this subject a few weeks ago I have received countless letters urging me to engage in a campaign for its control. Many sad cases have been brought to my attention; I shall give you but one. A normal, educated man married a wife of normal intelligence. A son was born, but he made no attempt to speak until he was four. He is now 27 and physically perfect. But he has the intelligence of a boy of four. You can doubtless imagine the quite indescribable mental anguish of his parents. All these years they have been attempting to instruct and bring up this imbecile boy. They love him—their only child. The father, when he brought the boy to see me recently, told me with tears streaming from his eyes that he and his wife had gone through unendurable purgatory for more than twenty years, and that they had reached the very limits of human endurance. They sent the boy to an institution. However, the poor imbecile fretted; the mother, motherlike, worried. She neither slept nor ate until her imbecile boy was restored to her. The father's aunt was insane. The germ of the evil of which I am speaking was there. The father heartrendingly deplored the inescapable fact that the law had not required him to be sterilized, thus preventing all this misery.

All the medical science in the world stands helpless before the mental bankruptcy and moral degeneracy of one idiot. And if that poor unfortunate idiot be allowed to propagate, what, then, becomes of our race,

We, in the medical profession, can deal effectively with most forms of disease; can cure a great number of the ills to which flesh is heir. But, notwithstanding, we are devoting a great deal of time and research to the prevention of

* An address delivered before the Canadian Club in Hamilton, April 28, 1933.

these diseases so many of which are curable. How much more important it is then for all of us, scientists and laymen, to cooperate in an earnest effort to prevent what by no human means can ever be cured!

In order to illustrate the hereditary nature of mental defects and diseases—the inviolable law of nature that *like begets like*—I shall mention two well-known historic records of the workings of the law of heredity.

First let us look at the bright side of the picture. For it is only by contrast—only by seeing what *can be* against the dark background of *what is* that we shall recognize the imperative necessity of putting an end to this malignant growth which threatens the very life of the race. Let us see for a moment how a legacy of good blood or good germ cells may enrich a nation.

Elizabeth Tuthill, a woman of splendid qualities lived nearly two hundred years ago at Hartford, Connecticut. She married Richard E. Edwards, a great lawyer. They had one son and four daughters. That union has left its mark upon American blood. And when anything marks a nation's blood, it marks for weal or woe its ideals, its institutions and its history. Later in life this same Richard Edwards married an ordinary, commonplace woman. She had ordinary, commonplace children. The splendid heredity of Richard Edwards was swamped by the mating. But the union of two streams of fine blood of similar characters begets greater. The son of the *first* marriage was Timothy Edwards, one of the founders of Yale University. He was the father of Jonathan Edwards, who also married a wonderful woman, Sarah Pierpont. From that union have descended 12 college presidents, 265 college graduates, 65 college professors, 60 physicians, 100 clergymen, 75 army officers, 60 prominent authors, 100 lawyers, 30 judges, 80 public officers—state governors, city mayors and state officials — 3 congressmen, 2 United States senators and 1 vice-president of the United States. Nor is that all. The direct descendants of this Jonathan Edwards include: Aaron Burr, who was Vice-President; Mrs. Eli Whitney, wife of the inventor of the cotton gin, and the novelist, Winston Churchill. The oldest daughter was Abigail. Perhaps the most notable descendant was Robert Treat Paine, one of the signers of the Declaration of Independence. Then there was Elizabeth, the next daughter, whose descendants include the Marchioness of Donegal, a distinguished woman of Ireland; and the Fairbanks brothers who manufacture weighing scales known all over the world. The next daughter, Mabel, gave the world Melville W. Bigelow, one of the greatest legal writers of our time and Morrison R. Waite, former chief justice of the United States. The glorious story of fine blood seems unending. Other notable descendants are Bishop Vincent, founder of the Chautauqua movement and father of George Vincent, head of the Rockefeller Foundation; Grover Cleveland, Ulysses S. Grant and Edith Carow, widow of Theodore Roosevelt and mother of his five sons, one of whom was killed in the air service in France. The remaining four are starting upon careers of honour and distinction. And so this splendid history of great blood continues invigorating, healthful, making its incalculable contribution to all that is best and noblest in the life of any nation. I am not surprised that many of the descendants of Elizabeth Tuthill—and they are to be found all over America—wear as a sign of distinction "The Tuthill Emblem"—a golden badge of honour. Honour, indeed—they are honoured, the nation is honoured, by such blood as that of the Tuthills.

Now for the contrast. We plunge immediately and headlong from national glory to national shame. Two hundred years ago there lived in New England a vagabond named Max Juke. The melancholy story of the descendants of this degenerate can soon be told. One thousand two hundred and twenty of these social scourges have been traced. Now you can watch the blood stream of a nation being polluted past all remedy. Of the descendants of Max Juke 300 died in infancy, 310 were professional paupers, 440 were wrecked by disease, 50 were prostitutes, 60 were thieves, 7 were murderers, 53 were criminals of some other kind. Many were habitual drunkards addicted to every form of vice and depravity.

In the face of the social menace of the Max Jukes of our nation, it would appear but the simplest form of commonsense—the only way indeed to save a race of fine people—to insist, as 27 out of the 48 States of the United States of America have insisted between 1907 and 1931, that mental deficients shall be compulsorily sterilized. Of all the unfortunate victims

who fill the mental hospitals of the United States no less than 50 per cent are the offspring of mental defectives. They, and all those across whose lives their pathetic condition falls like an ominous shadow, are but reaping the inevitable punishment, the horror of allowing to continue what should be immediately stamped out. By sheer weight of numbers the mentally deficient—the most prolific of all mankind—constitute such a threat to the well-being of the state as to imperil its very existence. Let it not be thought that I exaggerate. I have already referred to the dire prophecy that 75 years from now half of the population may be working to support the other and imbecile half. Leaving for a moment the medical or racial point of view and regarding it as an economist, the family of Max Juke, whose scandalous record I have already mentioned, cost the state $1,300,000 in 75 years. How, indeed, is it possible to place too great emphasis upon a social evil which cries aloud for remedy.

I have intentionally directed your thought to this menace as it exists in the United States in order that we may recognize, in all its evil potentialities, that same menace of racial degeneration within our own borders. What of Canada? What of Ontario? I shall bring to your attention certain definite facts and quote a few statistics. I wish to present a picture of conditions in Ontario, which I hope will remain continually in your minds until an enlightened public opinion demands legislation to curb this evil. At present Ontario spends $4,000,000 annually to maintain hospitals for the insane. But the "Max Jukes" of this Province go their way unchecked and unrestrained. Like begets like, and so they propagate their kind at a rate which requires that every 20 months a new asylum be built at a cost of $2,000,000 and with an annual maintenance charge of $300,000. At the present rate of increase in mental defectives, we shall within 25 years be spending $8,000,000 annually in this Province for their maintenance and we shall have twice as many institutions as we have now devoted to their care. In the mental hospital at Orillia there are several groups of half a dozen—each group *from the same family.* You can in imagination trace the course of such unchecked propagation. The seeds of deficiency are transmitted from generation to generation continuously affecting an increasing number of unfortunates and imposing upon the shoulders of the mentally and physically fit a heavier burden, which, by its economic weight, discourages them from raising large families. Devastating as a forest fire, and all the more terrible that it rages unseen and undetected in our midst, race degeneration takes its insidious toll here as everywhere else.

I cannot but feel that this is allowed to continue rather through ignorance than indifference. I feel sure that public opinion, once aware of the magnitude of this menace, will not be satisfied with less than thoroughly effective measures to make it in the course of time only a shameful memory, like the dungeons and torture chambers of the past. Between 1871 and 1931 our population little more than doubled, but the number of insane in our institutions multiplied sixfold and the cost of caring for them increased tenfold. I repeat the distressing figures—twice as many people, six times as many insane, ten times as heavy a burden of cost. Perhaps reference to one family history is all that is necessary to impress upon you the seriousness of the economic aspect of the problem. An immigrant tainted with mental deficiency entered this country. He, his son and two daughters and seven illegitimate offspring in the third generation are at this time costing a municipality $3,460.00 annually for support and care. Records have been kept of one Canadian family which has provided inmates for mental hospitals at New Westminster, London, Hamilton and Orillia. Of the four known branches, three are for the most part mentally defective. Ten Mongolian idiots have appeared in this family and twelve of its adult members were maniacs. Many other family histories could be cited; but why spend more time in the melancholy past and present? Our concern should be action that will mitigate this scourge in the future.

The remedy, the recourse which can save us from the horrors incidental to a continued spread of deficiency, is sterilization for individuals contemplating marriage when there exists the taint of insanity, mental deficiency or epilepsy in the family history. Such individuals should be subjected to thorough psychiatric examinations and sterilization advised if the dangers for their progeny seem great. It

is, above all, desirable that we look to the possibility of social legislation which will prevent the marriage of mental defectives unless first of all they be sterilized.

Not only would sterilization curtail the increasing demand for hospital accommodation for defectives, but it would permit of a restricted class of these defectives, who must now be confined, being allowed at large in the community. Thus it would relieve the pressure on public institutions. It would relieve the pressure on our penal institutions too. For, as Mr. Justice Oliver Wendell Holmes of the United States Supreme Court said *when upholding the Virginia Sterilization law;* "It is better for all the world if, instead of waiting to execute sentence upon degenerate offspring for crime, society can prevent those who are manifestly unfit from continuing their kind." The case of Buck *v.* Bell, decided on May 2, 1927, has definitely committed the United States to a policy of human sterilization as a means of coping with the socially undesirable in their midst. Sterilization promotes both the health of the patient and the welfare of society. It is in no sense a punitive measure. It is protection to the individual, to the state and to posterity. It has no ill effects upon the individual. On the contrary, it results in a better physical and mental condition. In the State of California a law permitting sterilization was adopted in 1909. Investigation has disclosed no serious complaints from the thousands of persons who were treated. Here in Hamilton are some far-sighted people who have been doing splendid work in connection with this subject, though handicapped by the lack of supporting legislation. However, they are courageously creating the public opinion which necessarily precedes the enactment of such measures. Mr. Kaufman, of Kitchener, has established a clinic in his city to deal with this condition in a practical way and he, as well as your local organization, is making a valuable contribution to the welfare of the race.

May the day speedily come when Ontario will awake, as Alberta and British Columbia have awakened, and as 27 States in the American Union have awakened, to the enormity of this peril and the necessity for prompt action. Alberta and British Columbia and 27 American States have adopted legislation permitting the sterilization of mental defectives. They realize, as I hope Ontario also will realize, that whereas material wealth can be replaced by man God's wealth of heredity stored in the germ cells if once lost can never, never be recovered.

I have said on a previous occasion, and I shall always be of the opinion, that moral and religious sense necessarily revolt against the destruction of human life at any stage. But sterilization contemplates no destruction of life. On the contrary, sterilization means the ennoblement of life by damming up the foul streams of degeneracy and demoralization which are pouring pollution into the nation's life blood. No reasonable man would countenance a diphtheria carrier going about communicating disease to many of those with whom he comes in contact. Yet the disease the diphtheria carrier transmits is curable and is incidental only to the immediate period of a few weeks during which it runs its course. But the infection transmitted by mental defectives is incurable. Its victims are the unborn generations. Its potency for misery and for suffering is great beyond all powers of description.

Sterilization of the unfit is not open to objection on the ground that it comprehends race suicide. On the contrary, it is the antithesis of race suicide; for what could be more suicidal, what more destructive to any race than to permit degeneracy to increase at its present rate? It is indeed suicidal for a race, a nation or a province to cast its germ cells, its precious jewels of heredity, into the oblivious, bottomless sea of mental, moral and physical degradation. Let us pause for a moment and in a spirit not of intrusion but of sorrow and pity gaze into a home—there are many such hopeless homes in this country—where feeble-minded parents are being left to care for their young. You will never forget this sight. Terrible is the plight of these parents and their children, but even more shocking is the apathy of public opinion which has permitted them to reproduce their suffering, yet menacing, kind. Ontario is well to the fore in many forms of social legislation. I am sure that with a full understanding of the problem of race degeneration public opinion will not hesitate to demand action designed to relieve existing conditions and to crush the menace which the future holds in store. In this Canadian Club and in other Canadian Clubs throughout Canada may leadership be given to such thought. Then the proud record of forty years will be crowned by still another distinguished contribution to the common welfare.

THE PREVENTION OF NEONATAL MORTALITY*

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"Infant mortality is a symptom complex whose diverse factors — hereditary, congenital and environmental—when judiciously balanced and evaluated present a composite picture of community life of absorbing interest and practical socio-medical value. The mortalities of infancy traced to their finer ramifications reveal not only the sanitary status of a community, but its social, economic and moral aspects as well. By a respectable and ever enlarging group of public health workers interested in child hygiene, the infant mortality rate has come to be regarded as the most sensitive index we have of social and sanitary progress."[1]

SIR ARTHUR NEWSHOLME states that "Infant mortality is the most sensitive index we possess of social welfare and of sanitary administration, especially under urban conditions." The study and prevention of infant mortality has commanded the attention of philanthropic individuals and health authorities for some time, but its greatest popular impetus has come since the opening of the twentieth century. Sir George Newman[2] says "It cannot be too distinctly recognized that a high infant mortality rate almost necessarily denotes a prevalence of those causes and conditions which in the long run determine a degeneration of race; and, further, that a high death rate of infants is an indication of the existence of evil conditions in the homes of the people, which are, after all, the vitals of the nation. Growing out of careful and extensive studies, fortified by the accumulated experience of many communities where intensive child hygiene work has been carried on, has come the conviction that infant mortality can and should be largely prevented. No longer can "man's inhumanity to man," as exemplified too often by his neglect and cruelty to children, be condoned by the antiquated notion that "God sets the infant mortality rate." The causes of infant morbidity and mortality are largely preventable, and man himself can do much if he will to mitigate or prevent them. There need, therefore, be no hesitation in making every practicable effort to reduce infant mortality. It is not only in accord with the highest feelings of humanity, but action which secures reduction of infant mortality also secures reduction of mortality at higher ages. The late Dr. Holt was equally convinced that a high infant mortality is in no sense a protection to our body politic. We must eliminate the unfit by birth, not by death. The race is to be most effectively improved by preventing marriage and reproduction by the unfit, among whom we would class the diseased, the degenerate, the defective and the criminal. In working for the survival of the feeble and the unfortunate we are not contravening nature's law and striving to save the unfit. A high infant mortality results in a sacrifice of the unfortunate, not the unfit.

The reduction in the mortalities of infancy thus far effected has taken place largely in the latter half of the first year. Very little progress has been made in limiting death in the neonatal period (under one month). It has been estimated that at least 40 per cent of the deaths during the first year of life occur in the first month, and in some countries a figure even higher than this has been quoted. One-third of this 40 per cent mortality occurs on the first day after birth. To give one a clearer conception of the neonatal mortality, Ballantyne[3] states "If one takes infantile mortality as 100 per 1,000 live births (and that rate is still far exceeded in many countries), then something between one-half and a third of all these infantile deaths are found to occur in the first month of life. Obviously, if the fatalities are evenly distributed over the 12 months, the neonatal ones should be only 8 or 9; instead of this, more than 40 of them are packed into the first month, and if this number were continued during the remaining eleven months the infantile deaths would number 500 out of every 1,000 live births."

One may ask the question, what is the limit to which we may hope to reduce the infant mortality rate? The answer is certainly less than 40 per 1,000. For example, in Roscommon and Cavan in Ireland, with populations of over 90,000, the infant mortality rates are 38

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and 40 respectively. In New Zealand the figure is about 40 per 1,000. It is believed that in the present state of our knowledge it is impossible to expect a greater reduction than to about 20 to 25 per 1,000, since that figure represents approximately the number of infant deaths due to antenatal causes the nature of which we do not as yet understand.

It is obviously impossible in the time at my disposal to even mention all the causes and remedies of infant mortality and morbidity in the neonatal period, and so I will discuss only those which are generally conceded to be outstanding.

It is well known that climate has a very important influence upon infant mortality, but just how the meteorological factors balance one another is not so well defined. The relation of excessively hot and dry summers to infant mortality has been pointed out in a number of studies. In comparing the infant mortality of different countries, or parts of the same country, the difference in climate must always be considered. For instance, the climate of New Zealand is very favourable to low infant mortality. A favourable climate is quite apt to be accompanied by more favourable housing conditions, as is also found in New Zealand. Another notable example is seen on the Pacific slope of both Canada and the United States, where the infant mortality rates have been on the whole the lowest in both countries, and approximately the same as that observed in New Zealand. It is fair to conclude, however, that even the unfavourable effects of the eastern climate may be neutralized to some degree by intensive child hygiene efforts. At any rate, a reduction of neonatal deaths is open to east and west alike, as climate probably has but little influence upon the early deaths.[1]

PREVENTIVE METHODS

The infant at birth is like a fish out of water (Feldman[4]). Inside the uterus it lived immersed in a water of constant body temperature, where microbes were absent, and where, in addition to being protected from all sorts of injury or other stimuli—tactile, thermal, auditory, etc.—it received its nourishment as well as its oxygen direct into its blood without any effort on the part of its digestive or respiratory systems. During the process of birth the fœtus moulds itself to the size of the maternal passages in the same way as a cork moulds itself to the size of a bottle neck. The effects of this pressure make themselves felt on the whole of the fœtus, but especially on the head, so that in unfavourable cases the child may be born dead or die during its early stages of infancy, or may grow up physically or mentally maimed if it manages to escape with its life.

As soon as it has successfully accomplished its hazardous journey and passed safely through the "Arc de Triomphe", as the maternal pelvic arch may rightly be called, the infant finds itself in entirely new surroundings. It is now thrown upon its own resources in a strange and rigorous, microbe-laden atmosphere of ever-changing temperature and purity. It must not only recover from the injuries received during birth, but must fight its own battle to keep itself alive. It has to keep itself warm by means of its own heat-regulating mechanism; it must feed itself by means of its own digestive apparatus, and inhale oxygen by means of its own respiratory mechanism. Its circulatory system, especially the heart, has to go through certain structural changes to adapt itself to its new mode of breathing, and in addition, the infant has to accommodate itself to various sensory stimuli, such as heat, light and sound, etc., to which it is quite unaccustomed. No wonder, therefore, that nearly half of the total mortality of infants under one year occurs during the first month of life, and that about one-third of the entire neonatal mortality takes place on the first day after birth.

Many writers, impressed by the very slow decline in the neonatal mortality, have come to the conclusion that such deaths are not preventable, and are due to prenatal hereditary causes over which we have no control. Others believe that this gloomy view is not justified, and we in Toronto are in accord with this latter belief. Injury at birth and syphilis are responsible for a certain number of neonatal deaths which ought to be entirely eliminated by improved obstetric technique and proper prenatal supervision. Diarrhœa and to a certain extent pneumonia and bronchitis are preventable. A certain considerable proportion of cases of prematurity can be prevented by skilled antenatal treatment (*e.g.*, syphilis, toxæmia, tuberculosis, etc.), and their deaths prevented by patient, painstaking and intelligent postnatal care, *viz.*, proper feeding and protection against ex-

posure, etc. Even a certain proportion of the deaths coming under the heading of congenital malformations can be prevented, not indeed by diminishing their incidence by prenatal care, but by diminishing their fatality rate by proper attention and treatment (*e.g.*, cleft palate, certain cases of congenital heart disease, etc.). It is only the small group of those congenital malformations compatible with fœtal life but incompatible with postnatal life, such as obliteration of the œsophagus, or of the bile ducts, or of the urinary passages, etc., which are not amenable to preventive or curative treatment.

The best proof of all of the preventability of early infantile deaths is the fact that they have actually been prevented. Dr. Dublin has analyzed the results of intensive prenatal and early postnatal care—other than the provision of skilful midwifery attendance and of proper anti-syphilitic treatment—given by the Maternity Centre Association of New York to 8,743 patients. It is shown by his analysis that congenital malformations, prematurity and diarrhœa deaths have been greatly diminished by such supervision. From the character of the supervision, no reduction could be expected in the mortality rates from syphilis and birth injuries. Another striking example may be cited in the fact that out of 331 premature infants admitted to the Hospital for Sick Children from various parts of the country, the mortality was 66.2 per cent, while out of 478 premature infants born at the Burnside Department of the Toronto General Hospital, under careful obstetric and pædiatric supervision, the mortality was but 25.3 per cent. Between June 1, 1931, and June 1, 1932, the mortality from prematurity was but 13.5 per cent at the Toronto General Hospital. During this same period there were 1,006 births with a neonatal mortality of but 18, probably the irreducible minimum, according to Feldman's estimates. Hence, we may conclude that neonatal mortality can and ought to be prevented to a very large extent.

From my observations I feel that there are three main indications for the physician in the reduction of neonatal deaths: (1) more extensive employment of the natural feeding of infants; (2) improvement in artificial infant feeding; (3) prevention of respiratory diseases in the new-born.

BREAST FEEDING

Breast feeding is a function of which there should be little to learn in the year 1932, yet never probably has breast feeding given so little cause for satisfaction as at this time.[5] During a survey made a few years ago by the author[6] it was found that Canadian mothers nurse their infants less than do foreign-born women; that the well-to-do of Toronto and environs nurse their infants less than do those of the poorer classes; that maternal nursing is less to-day than it was twenty-five or thirty years ago in Canada, but that in view of propaganda in the child welfare clinics of this city there has been a noticeable improvement; that the infrequency of nursing depends chiefly on the ignorance of the laity and the indifference of the physician. It is our duty as physicians to remedy this evil.

The late Abraham Jacobi, in New York, stated that there is no such thing as complete absence of breast milk; that every woman can nurse her infant, and that it behooves the diligent nurse and physician to see that she does. Every physician will agree that there are some women who cannot, such as those suffering from debilitating diseases and the neurotic type, but unfortunately it has become the rule in all too many cases for the physician to state that the milk does not agree with the infant, without an adequate trial, the result being that the child is fed according to the "canned directions," frequently with the inevitable result. There is no test which will tell whether a milk is good, bad, or indifferent, except the infant. If the baby is thriving the food is all right; if it is not, there is either something wrong with the infant, which can be determined by physical examination, or else the food is deficient either in quantity or quality. It is up to the physician to determine these factors.

Many babies are weaned in the first few weeks of life. In some cases, it seems, natural feeding is not attempted. Mothers who succeed in nursing very commonly require help in the nourishment of their infants, and there is recurring familiar difficulty in prolonging function to its term. Every country records a similar experience. Even in child-welfare centres, where breast feeding forms the first article of a universal creed, the percentage of breast-fed babies rarely reaches 100.

There is happily little doubt that some of the difficulties are fictitious. If this were not so, the degree of failure must surely be looked on more seriously, since reproduction as a whole process is concerned and not merely one of its phases. If lactation is abrogated or cannot be made to act, if the reproductive cycle cannot be concluded, if the child must go unprovided, how shall that function itself be safe? Will the failure presently be extended elsewhere where it is more obviously destructive? But these questions are left without answers in an age that in most spheres is intent on extending physical achievement rather than contracting and relinquishing it.

The issue cannot be dismissed on economic grounds, since the poorest mothers are not those who commonly find difficulty in breast-feeding. Arbitrary decisions to wean must also, of necessity, be discounted as a large factor. But there may have been something of a moral change, wide-set in the community, that injures breast feeding nearer its source, since successful nursing seems no longer to be considered a matter of prestige. The privileges of breast-feeding have somehow become overshadowed, and there is common ignorance as to what functioning actually entails. Here, if she but knew it, the mother may find some of her best experience in a service of unequalled value to a child. Yet women seem very often not to be oppressed by their failure in this that is act and pact of true motherhood.

There are many women who still nurse their babies successfully, and who would never fail in this duty, but these do not predominate amongst the educated class. Women of this sort feel the impress of many factors operating nervously and physically to disturb balance, and simple processes are apt to become difficult. In spite of a cult of parent-craft, it is here that the most elementary of its privileges becomes most readily abandoned, and the child suffers the injury of weaning.

There are mothers who say that, in spite of much eagerness, they have failed to secure the necessary teaching in breast feeding. Certainly some mothers require tuition. The doctor in charge may often be sorely tried if his training has shown him more of artificial feeding than of the subtle details of nursing technique. The person most intimately associated with the mother, however, is the nurse, and she it is who, a figure of undisputed authority, is alleged most often to find the greatest difficulty in keeping the baby at the mother's breast. All of these factors may account in part for a problem that, if it were real, *i.e.*, biological, would surely be of the most serious that any generation could meet.

There are further interferences still that have little to do with physiology. The field for commercial exploitation is large in this connection, and makers of artificial foods vie with one another in proclaiming the virtues of their wares. Mothers receive the full onslaught of a whirlwind of advertisements and of propaganda most ingeniously worded to assail their faith. Before their time is come, almost, they have begun to believe that they "can't nurse their babies" or that the offspring of their efforts will be "bonnier" if not subjected to the toils of the breast. Breast-feeding, in consequence, has not gained in public estimation, and many who would have breast-fed have not dared persevere under the implication that this is an ordinary way of infant nurture, and that babies must not be deprived of anything "scientific" or "good" merely to save the instinct of the mother to nourish and care for them herself. In these circumstances the first onset of symptoms natural to a new physical activity is apt to be acclaimed as a proof that "the breast is not agreeing," or delays are quoted as evidence before there is any reason to doubt the response. Fathers anxious that their wives should be comfortable are readily persuaded of the "strain" of breast feeding. Utterly anticipated by the interests concerned the present day passion for "hygiene" has here failed to make good, and there has been no crusade to come to the aid of nature and good sense. The truth, however, remains as it was. Breast feeding is a function that depends in the first place on good general health. The general health of the community has improved incontestably with better habits of dieting and hygiene and a raised standard of living since the war. There is every reason to suppose that, with a little due concentration and the necessary statement of relevant facts, breast feeding should be easier and more certain than ever before.

It is not artificial feeding *per se*, since among the well-to-do bottle babies do well. The secondary factors are bad milk, unsuitable

food, improper methods of feeding, lack of maternal care, bad surroundings, heat, humidity, dirt, and overcrowding, which favour spread of infection. These common errors are too well known to need amplication at the present day. Suffice it to say that in an investigation carried on at the Hospital for Sick Children during the past three years, 176 cases of intestinal intoxication were studied from every conceivable standpoint, *viz.*, bacteriological, serological, chemical and social. In a number of instances the germ producing the disease was found in the intestines of the flies inhabiting the patient's home. Another noteworthy observation was the fact that only three infants of the series were breast-fed. Methods of artificially feeding the normal infant to-day are simple and productive of most satisfactory results. It behooves the physician in general practice to familiarize himself with the various procedures. No student graduating to-day from an A1 university is without such knowledge, and during his undergraduate years has had much attention focussed on the normal growth, both mental and physical, of the infant.

Deaths from respiratory diseases are common in the neonatal period. This condition will not be improved until both physicians and the public appreciate the importance of aseptic nursing, and that these diseases are transmitted through droplet infection and that it is not simply the case of "open the window and influenza." How common is the experience that fathers, grandmothers, aunts, children, etc., gather round "to gloat" over the new addition to the family, and during the process distribute, or better "spew," their germs from their noses and throats (there are usually some of them suffering from some type of nose or throat infection) directly on to the newborn infant, who has not been sufficiently long in its new environment to develop any immunity, and the next thing we hear is that the "poor baby died of pneumonia."

To the medical man the problems of infant mortality make more than a professional appeal (Bolt[1]). In their study he is inevitably brought face to face with socio-economic forces which not only influence the life of his own community but also affect the future of medicine itself. His social conscience is quickened and his humanitarian interests activated. The physician, whether a pædiatrician or not, cannot escape the responsibility which faces him in a community where infant mortality remains unduly high. He above all others should be in a position to point out the various factors entering into the infant mortality problem, and take definite steps to assist his community in gearing up their resources to bring about a substantial reduction.

The treatment and cure of the comparatively small number of ill babies which come under the surveillance of any one physician in his private practice year by year can influence but little the infant mortality rate. It is, therefore, unbecoming, as well as untenable, for any physician to take the position that organized child-hygiene work in his community will seriously cut into his private practice. As a matter of fact, in these communities where infant-hygiene work has been well conceived and carried out with the hearty cooperation of the medical profession, it has proved satisfactory to physicians and mothers alike in making it possible to get the babies at a much earlier period, to forestall their sickness or institute treatment at a time when the best results can be obtained.

In conclusion let me state that, as has been shown, neonatal mortality can be greatly reduced through intensive observation and fulfilment of (1) prenatal and postnatal supervision; (2) encouragement of maternal feeding; (3) better artificial feeding; (4) the prevention of respiratory diseases.

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ESSENTIAL CONSTIPATION: ITS DIAGNOSIS AND TREATMENT*

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THE purpose of this paper is to review briefly the more recent developments in our knowledge of essential constipation and to discuss treatment based upon accurate diagnosis. I say "accurate diagnosis" advisedly, because I know of no other condition in which a physician accepts the patient's own diagnosis so readily. If a patient comes to you and says he has heart disease, you may listen to him tolerantly, but make a mental note that, after thorough examination, you and not the patient will decide whether heart disease is or is not present. But, nowadays, since constipation and sex have become topics of drawing-room conversation, and the daily newspapers contain elaborate illustrations of the colon with the advice of "world-renowned" physicians not to neglect this source of all ills, the average person thinks he can diagnose his own case. The physician's advice is sought for treatment only after the widely advertised cures, together with the counsel of various friends and druggists, have apparently failed. Unfortunately, the patient's diagnosis is commonly accepted by the physician and a course of treatment prescribed without first taking the necessary steps to investigate the complaint. Such a procedure is fundamentally wrong and the results are usually discouraging both to patient and physician.

ANATOMY AND PHYSIOLOGY

In order to understand the underlying factors in constipation it is necessary to review briefly the anatomy, and more particularly, the physiology of the bowel. Hurst and his associates in England and Alvarez in America have made outstanding contributions to our knowledge of the gastro-intestinal tract within recent years, and it is largely upon their work that the following summary is based.

In animals the length and anatomical variations of the digestive tract seem to depend on the amount and type of food eaten, *e.g.*, grass, leaves, seeds, etc. Thus, the giraffe, which lives on the tough branches of trees, has an intestine one hundred times its body length, while the cat or dog, which lives on easily digested meat, has a bowel only three or four times its body length. Text-books state that the small bowel of man is 22 feet in length, but this measurement represents its condition after the intestinal muscle has lost its tone and has become stretched. Recent experiments made by passing thread on living subjects have shown that the small intestine is only six or ten feet long. Apparently then, as Alvarez[1] points out, "Man, with his very short and very simple digestive tract, was intended to be carnivorous, and, actually, delvers in the caves of Europe know that he was a hunter, a herdsman and a fisherman for untold thousands of years before he learned to live on the products of the soil." If Nature had intended us to eat rabbits' food, we would have been given a rabbit's bowel to take care of it. Actually, the full cæcum of a rabbit makes up about one-third of the weight of the animal. It is important to remember these facts when we discuss, a little later, the present harmful craze for roughage diets.

Why does food go down the bowel? This question has worried physiologists for many years and, although various theories have been propounded, the final word has not yet been said. It was first thought that peristalsis depended upon contraction above and dilatation below the point of stimulation. It has been found impossible to prove this theory. Opposed to those who support it are many who hold that the control of peristalsis rests in collections of nodal tissue situated at intervals in the wall of the digestive tube, and that each node sets the pace for and controls the rhythmical activity of a certain section of the tube, a mechanism similar to the nervous control of the heart. But here again proofs are very vague, and the claim that Auerbach's plexus consists of nodal tissue is strongly disputed. Recently, Alvarez has brought forward the gradient theory. He has shown that

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proximal segments of the intestine are more irritable than distal segments and that food residue tends to pass from more irritable to less irritable segments. In keeping with this, he has also shown that the more irritable segments have a higher rate of rhythmic contraction than the less irritable; *e.g.*, in the rabbit, rhythmic contraction of the duodenum is twenty times per minute, while in the lower ileum it is ten. Finally, there is some evidence to show the existence of an underlying metabolic gradient, *i.e.*, the rate of the metabolic process is more rapid in proximal than in distal segments. While this theory has not yet been proved for human beings, it is, I think, more convincing than any other. Reversal of the gradient would result in nausea, vomiting and obstruction. It has been shown, for instance, that in some pregnant animals the gradient actually is reversed, and we all know that many feel nauseated and vomit when some irritating substance is injected into the rectum.

It is important to remember that the bowel has a double nerve supply—parasympathetic through the vagus or pelvic nerves, which stimulate the bowel to contraction, and sympathetic through the splanchnics, which inhibit. It is through these nerves that the bowel may be influenced by the higher centres, and also through them that conditioned reflexes are established. Conditioned reflexes are the basis of what are commonly called "habits" and are largely concerned in much of the activity which was previously regarded as instinctive. Pavlov's researches have shown that even a dog's choice of food is partly an acquired or conditioned reflex, and it is probable that such reflexes account for the fact that some people eat one kind of food and another people another kind, and also may explain why the bowels of some people act with such regularity that a watch could be set by their movements. In spite of this, however, we must remember that the bowel is highly autonomous and has been shown to function normally when all the extrinsic nerves have been cut.

The normal movements of the colon have been carefully studied by Hurst.[2] He has shown that food-residue passes through the colon as a result of mass-peristalsis, the sudden contraction of the colon forcing its contents forward a distance of a foot or more in a few seconds. This action takes place three or four times a day and is apparently initiated by the entrance of food into the stomach—the so-called "gastro-colic reflex."

Normally, the rectum is empty until, by means of mass-peristalsis, it becomes rapidly distended with fæces from the pelvic colon, causing a sensation of fullness which is the call to defæcation. Actual defæcation is normally initiated by a voluntary act, by which the intra-abdominal pressure is increased (by depression of the diaphragm and contraction of the abdominal muscles) and the anal sphincter relaxed. Reflexly, mass-peristalsis then occurs, by which the entire colon below the splenic flexure is emptied. If the call to defæcation is disregarded, the rectum may return its content to the pelvic colon, or the content may remain until, later, further distension of the rectum causes a stronger call. Continued disregard of the call to defæcation results in an atonic distended rectum, to which the term "dyschezia" is applied. This results in one important type of constipation, which we shall discuss later.

We must now discuss an important point in the consideration of constipation—the rate of passage of food-residue through the bowel. This has been studied by means of the ingestion of charcoal dyes, glass beads, etc., noting the time of appearance and disappearance from the stool, and also by following a barium meal by means of the x-ray. The stomach normally empties itself in from three to four hours. About three and one-half hours are required for the chyme to reach the end of the ileum, and a delay of an additional one and one-half hours is common before it enters the cæcum. In about nine hours the food has reached the splenic flexure, and in eighteen hours it has arrived at the pelvic colon. Thus, in many normal people, some of the charcoal taken before breakfast one morning may appear in the stool 24 hours later—but it forms the last part of the stool. As the stomach and small bowel have emptied long since, it follows that much of the food taken after the charcoal remains in the large bowel. We know that the descending colon is always empty. ***Therefore the cæcum, ascending colon, and most of the transverse colon always contain food residues.*** Alvarez, in a series of experiments on young men with good digestions, estimated, quantitatively, the amount of barium passed in the stools after sixty grams were given by mouth.

He found that 75 per cent of the drug was passed by the third day and, after that, there was a slow excretion for several more days. This delay in the passage of the material through the colon is to be expected, when we consider that the two very important functions of the colon are (1) to absorb water, and (2) to act as a reservoir during the digestion of cellulose by bacterial fermentation. Thus we see that, contrary to widely-held opinion, the bowels should normally contain food-residues and should not be empty. The rectum, however, normally, is empty and we have seen that its distension causes a desire to evacuate it. We also know that incomplete emptying of the rectum causes local discomfort, headache, sense of fatigue, etc. We can, therefore, readily understand that the average person, confusing the rectum with the colon, concludes that a complete emptying of the large bowel is essential to good health and so falls an easy prey to advertisers of laxatives and food fads. It must also be quite clear that abnormal irritation of the digestive tract, by which food is rushed through it, interferes with gastric function, prevents proper digestion in the small intestine, and hinders absorption of water and digestion of cellulose in the large bowel. It is no wonder that habitual users of laxatives eventually come to us complaining of headaches, indigestion, flatulence, loss of weight and strength, and many other symptoms, which they blame on constipation.

Passing reference must be made to the question of intestinal auto-intoxication. Medical opinion is sharply divided on this point. Some observers claim that no toxins are absorbed from the healthy colon; others state that if any do pass, they are rendered harmless by the liver and do not cause symptoms. Alvarez has shown that distention of the rectum will cause headache, and suggests that many symptoms ascribed to intestinal auto-intoxication may be due to disturbed rectal reflexes. However, there are many others who believe that in the presence of intestinal stasis the irritated mucosa of the colon allows the absorption of toxins in amounts sufficient to cause symptoms. I have been able to show experimentally[3] that the substance histamine is absorbed from the colon of animals in sufficient quantity to cause a marked fall in blood pressure. At present it seems impossible to reach a final conclusion in regard to intestinal auto-intoxication.

CLINICAL DIAGNOSIS

With this brief review of the anatomy and physiology of the colon, we now approach the clinical diagnosis of primary constipation. The first step is to exclude by a careful history and clinical examination disease elsewhere in the body and organic disease in the digestive tract itself. Being satisfied that constipation is the primary condition present, the next step is to determine the type of constipation with which we are dealing. Constipation may be defined as an undue delay in the passage of food residues through the colon or, according to Hurst, as a condition in which none of the residue of a meal taken eight hours after defæcation is excreted within forty hours. It is now generally recognized that two main types of constipation occur, (1) colon constipation and (2) dyschezia.

Colon constipation.—For our purposes colon constipation may be divided into three classes: (1) general undue delay in the passage of food-residues through the colon, which may be termed "sluggish colon;" (2) an over-irritable or spastic state of the colon, termed spastic constipation; and (3) an atonic condition of the colon, which is rare and is termed atonic constipation.

Dyschezia.—Dyschezia is a stasis in the rectum or pelvic colon due to a want of proper proportion between the power of expelling the fæces from the pelvic colon and rectum, and the force required to do this completely. In other words it is a failure of the mechanism of defæcation as a result of which the rectum or pelvic colon does not empty properly. It is commonly caused by a habitual disregard of the call to defæcation.

Not infrequently the type of constipation present can be diagnosed from the clinical history. Thus, in colon constipation, there is a feeling of abdominal discomfort just below the umbilicus and in the left iliac fossa, or a sense of fullness behind the symphysis pubis, accompanied by such general symptoms as headache, malaise, sense of fatigue, heartburn, flatulence, etc. In spastic constipation it is sometimes difficult to rule out chronic appendicitis or cholecystitis, because the patient often complains of discomfort amounting to actual pain in the right side. However the presence of small round

lead-pencil stools due to associated spasm of the rectum and anal sphincter usually makes the diagnosis clear. In dyschezia, on the other hand, there is a sense of fullness in the rectum, a feeling of being unable to empty the rectum completely, or complaints of hæmorrhoids and other symptoms of rectal congestion. If the dyschezia is of the sigmoid type there is usually discomfort in the left iliac fossa and sense of distension immediately above the pubes and, in addition, the patient may state that in moving the bowels there is a single action from emptying of the rectum, but that this is not followed immediately by another action from the emptying of the pelvic colon. In both types of dyschezia the patient complains of dry, hard stools which are always passed with difficulty.

Before proceeding with physical and laboratory examinations some preliminary preparation is advisable. The late Geoffrey Evans,[4] of London, devised the following routine which I have found to be of considerable value. The patient is instructed "to take a low-residue diet, two drams of paraffin oil every night at bedtime, to stop all laxatives, and to report again at the end of seventy-two or ninety-six hours." At the same time he is advised "to make an effort to empty his bowels three-quarters of an hour after beginning breakfast, at some time between 6 and 9 o'clock at night, and at any time of the day that he feels the call to go to stool. The low-residue diet is prescribed with the object of preventing abdominal distension, in case the patient should be suffering from spastic constipation. The paraffin oil is to prevent the accumulation of very hard fæces in the rectum and pelvic colon, in case the condition should be one of dyschezia. Laxatives are stopped to allow of the diagnosis of the fact of constipation, and of its variety when present. The bowels having been emptied by laxatives, it naturally takes twenty-four hours for a normal food residue to collect, and another twenty-four hours before this food residue is an efficient stimulus for evacuation. Indeed, owing to the excessive stimulus to which the bowel has become accustomed by the habit of taking laxatives regularly, it may be a further twenty-four hours before a normal stimulus is effective in provoking peristalsis. The instruction to make an effort to empty the bowels three-quarters of an hour after the beginning of breakfast is given with the object of allowing the gastro-colic reflex time to act, and in case, as the result of some conditioned reflex, it should have become the habit of the bowel to respond to a gastro-colic reflex at a later time in the day, the patient is advised to make the additional effort between 6 and 9 o'clock at night as a regular habit, and at any hour of the day if he feels the least inclination. At the same time the patient is advised to get up early enough in the morning to have plenty of time to wash and dress before breakfast, time to enjoy his breakfast, and time for defæcation before starting the day's work; he is also advised not to strain at stool, the gastro-colic reflex and the defæcation reflex being relied on for normal evacuation." Hurst also recommends the taking of two or three charcoal tablets with some food eight hours after defæcation, and observing after what interval black fæces are passed. If some of the charcoal is not passed at the latest the second morning after it is taken, constipation is undoubtedly present.

On return of the patient the clinical examination is continued. Careful palpation of the relaxed abdomen may now reveal the presence of an accumulation of fæces in the cæcum and ascending colon or transverse colon indicating stasis in these parts. A rectal examination should invariably be made. In rectal dyschezia the rectum is full of fæces; in sigmoid dyschezia a mass of hard fæces may be felt through the anterior wall of the rectum; in spastic constipation the rectum is empty and there is spasm of the anal sphincter, while the iliac colon may be felt like a cord in contrast to the full, firm and tender cæcum and ascending colon. Finally, the general condition of the patient, his colour, nutrition, the state of the nervous system, and his mental attitude, will frequently aid in making an accurate diagnosis.

In regard to laboratory examinations, I would urge a careful investigation of the stool. Just as you would certainly hesitate to express an opinion on the condition of a patient's kidneys without examining the urine, so you should never express an opinion regarding the bowels without examining the stool. If possible all of the stool passed during one act of defæcation should be seen. The size and shape of the stool indicate the state of tone of the rectum and anal sphincters; the bulk gives some idea of the patient's diet and rate of

passage of food residues through the bowel. If the last part of the stool is soft or semi-solid, it is likely that evacuation has been complete. The reaction of the stool is important,—abnormal acidity indicating excessive fermentation, and abnormal alkalinity excessive putrefaction. The presence of mucus, blood or pus indicates organic disease. If a small quantity is well mixed with a little water and placed on a black plate, a fairly accurate idea of the completeness of digestion may be obtained,—excess of meat fibres indicating insufficient pancreatic digestion, excess of vegetable residue insufficient cellulose destruction, and the presence of fibrous tissue, (rarely obvious unless very underdone meat has been eaten) deficient gastric digestion. Microscopic examination may reveal the presence of blood corpuscles, pus, and the ova of intestinal parasites.

Examination with the sigmoidoscope, although rarely carried out, except in hospital practice, is of great importance in eliminating the presence of organic disease, and this assurance is frequently all that a constipated patient requires to cure his complaint.

In many cases, however, final diagnosis can be made only by x-ray examination. A barium examination is of particular value in excluding organic disease of the gastrointestinal tract, such as early carcinoma, diverticulosis, etc., and it is of great assistance in determining the type of constipation present. Beware, however, of accepting from the radiologist such loose statements as "barium scattered in the large bowel", "48-hour colonic stasis", "ileal stasis", and "spastic colon". It is essential to study the plates yourself and correlate the appearance of the bowel with your history and clinical findings. If stasis is present, you want to know what part of the bowel is affected, whether dyschezia is present, and many other points you may have in mind from your previous diagnostic impression.

TREATMENT

One of the first essentials of treatment is to institute proper hygiene of the bowels. Neglect of this point is not only often the sole cause of dyschezia but is also an important factor in the majority of cases of constipation of every variety. An attempt should be made to open the bowels every day at the same hour, preferably immediately after breakfast, and a call felt at any other time of the day should be obeyed at once. Sufficient time should be spent over the act of defæcation to allow complete evacuation. In the majority of people the rectum and part of the pelvic colon may empty with the first effort, but repeated attempts are necessary if evacuation is to be complete. It may be necessary to advise some patients to wait as long as fifteen minutes at stool.

It is also important that the closet should be clean and comfortable. The Abbé de Chaulien, writing to a lady from the Chateau des Bardes in the seventeenth century, describes the luxuries he is enjoying and how every room has its own commode of rare porcelain with a velvet seat. "The Marquis de Bethune," he adds, "has his brought to my room, and we pass hours together in this delightful way; there is not a constipated person who would not get diarrhœa on such a commode." There should, moreover, be a sufficient number of closets in every house, as a single one is quite inadequate for a family of four or five persons, particularly if several of them have to hurry away to business or to school immediately after breakfast. The seat of the toilet should be low, to allow of proper posture. In Japan, seats are rarely used at all; the person squats over a hole in the floor. In this position, with the thighs forcibly flexed on the abdomen, the intra-abdominal tension is greatly increased and defæcation more easily accomplished.

Another feature of successful treatment in many cases is psycho-therapy. It is frequently necessary to eradicate certain fixed ideas the presence of which inhibits intestinal action and defæcation. The most common of these is the conviction that constipation will inevitably result if no artificial means is taken to produce regular action of the bowels, and that occasional failure to open the bowels is dangerous and will result in so-called "stoppage" unless purgatives or an enema be taken. Some get so worried that the very violence of their efforts to obtain bowel movements inhibits the involuntary and reflex part of the act. All such fears should be allayed by the physician, and the patient encouraged to take the view that bowels were made for man, not man for his bowels. There is an idea now prevalent that in

every individual the bowels must move at least once a day. While this may be true for most people, it is important to remember that many perfectly healthy individuals move their bowels once in two or three days or even once a week. Beware of interfering with the habits of a lifetime in a person with no symptoms who feels a little worried after reading a lot of bunkum in the press about daily bowel movements.

We must now discuss that all-important question of diet. At present there is a great fad for diets of all sorts for all conditions, and almost every patient who consults a doctor confidently expects to be placed on a diet, so much so that if the expected diet is not prescribed another physician is at once chosen. Undoubtedly, errors of diet are among the commonest of all the causes of constipation, and complete relief can frequently be obtained by an alteration in the diet alone. Hurried meals at lunch counters, impossible ice-cream mixtures at any hour, rich pastry and cakes at afternoon teas, heavy salads and a variety of liquors at late suppers, are only a few of the many causes of indigestion and constipation in these days of high-pressure living, and it is small wonder that so many people consult the medical profession in order to obtain some valid excuse for a return to more regular and sane methods of living. The press, however, is more often the first to be consulted. Bran, plain or disguised in many ways, coarse breads, raw cabbage, and all kinds of high residue foods are advertised and the so-called "roughage diet" advocated for all types of constipation. Now, from our discussion of the physiology of the bowel, it is obvious that in colon constipation, where the intestine lacks efficient stimulation, and perhaps in mild dyschezia, a moderate increase in food residues is a desirable feature of successful treatment, but in spastic constipation, which is very common, a high-residue diet is absolutely contraindicated — the bowel needs the rest afforded only by a low-residue diet.

Various types of lactic acid milk—*B. bulgaricus* and acidophilus cultures—are frequently advocated in the diet of constipated patients. It is true that lactic acid has a mild stimulating action on the bowels, but its chief action is to inhibit the growth of certain intestinal organisms. It should be used, therefore, in cases of constipation associated with infective colitis, especially when the stools are offensive and alkaline.

It is not within the scope of this paper to discuss at any length the vexed question of the use of purgative drugs. Some prefer to avoid purgatives entirely in the treatment of constipation, but many of these drugs are less irritating to the bowel than excessive quantities of coarse indigestible food, and there are definite indications for their use.

The choice of a purgative depends on the individual and the type of constipation present, and the dose prescribed should be just sufficient to cause one stool as nearly normal in amount and consistency as possible, to be passed daily. Having accurately diagnosed your case, it is important to choose a drug best suited to the condition present. Thus if the nervous system is depressed, strychnine is of value; in spastic constipation and lead-poisoning, atropine is indicated; in constipation associated with severe pain, opium may be required. Cascara and castor oil act on both the small and large intestines, and may therefore interfere with digestion, whereas aloes and senna act on the large intestine only. Phenolphthalein is one of the safest and best purgatives for general use, if taken in proper doses. Saline purgatives have the advantage of rapid action and if taken in the early morning usually cause a movement at the normal time after breakfast; their disadvantage is that they empty the entire colon at one stool and an empty colon is not normal. They also depress nervous people and sometimes cause abdominal discomfort, headache, and nausea, without acting on the bowels at all. Mercurial purgatives, such as calomel, are somewhat uncertain in action but are valuable for occasional use in so-called biliousness. Where it is desired to increase the bulk of the stools and render them more soft, a combination of agar-agar and liquid paraffin is of great value. If such a preparation is to be used over a long period, it should not contain any purgative drug, owing to the danger of intestinal irritation and systemic poisoning.

In cases of dyschezia an enema of warm water taken daily for two or three weeks often effects a cure without further remedial measures. Personally, I never advise the use of so-called high colonic irrigations. Rectal suppositories of glycerine are also of value in treating dyschezia. Properly carried out both of these treatments

keep the rectum empty and allow it to regain its normal tone. It is obvious that purgatives are useless in this condition. In certain patients with weak flabby musculature, trunk bending exercises and abdominal massage may be used with benefit. Surgery may have to be resorted to in cases of definite obstruction by kinks, adhesions, etc.

In conclusion, may I quote Dr. Edmund Spriggs, who said recently[5] that "the colon had been abandoned by Metchnikoff as a useless relic, stormed by half a generation of enterprising surgeons who removed large pieces or when most merciful stitched it in its presumed place, laved with many waters by physicians, and dosed by the public; it has been and still is a battlefield with long-drawn-out onslaughts and retreats—the Flanders of Medicine." Rational treatment based on an understanding of the physiology of the colon, together with accurate diagnosis, may end this war and bring victory to organized Medicine.

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BLOOD TESTS IN THE ASSESSMENT OF THE CONSTITUTIONAL STATE IN TUBERCULOUS PATIENTS*

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FOR some years past the writer has been applying to the study of tuberculous cases a group of simple blood tests—the erythrocyte sedimentation test of Fahraeus, the total leucocyte count, Von Bonsdorff's modification of the Arneth index and the lymphocyte-monocyte ratio. None of these tests is applicable as a means of diagnosis, but each and all of them are of great value as aids to prognosis, as indexes of the constitutional state of the patient, and as measures of the progress of cases under treatment. These tests are simple, but may, if carried out with all possible elaboration, be so time-consuming as to be impossible of application to more than a few cases, and yet each of them is important and the information gained from an integration of all four methods is more valuable than that given by any one of them alone. It is to be noted, too, that the blood changes observed in the course of tuberculous disease are so well marked that minor alterations may to a great extent be ignored.

With these considerations in view, the writer has attempted to simplify his technique so as to allow of easy application of the tests to a large number of patients. A micro-method has been devised for the sedimentation test which is applicable to a sample of blood collected by pricking a finger. This same sample of citrated blood is used, after the reading of the height of the blood cell column at the end of one hour, for the estimation of the "total leucocytes"; and the writer has satisfied himself that the "count" remains practically unaltered for at least 24 hours, a point of considerable importance where a patient is examined late in the day as the sample can safely be left in the sedimentation tube overnight and counted next morning. The enumeration of lymphocytes and monocytes is carried out on a dry film stained by Leishman's method and is combined with the estimation of the Von Bonsdorff (Arneth) count.

While it is possible that slightly more exact results may be attained by using a larger volume of blood for sedimentation in a longer tube of greater calibre, and that vital staining may afford greater certainty in the recognition of the occasional doubtful types of monocyte, still experience has shown that the simplified methods above referred to give information of the greatest utility. It is claimed that these methods afford a valuable amplification to the grading of cases undergoing sanatorium treatment, and that they are invaluable in estimating the results of gold therapy and other new methods of treatment.

THE SEDIMENTATION TEST

In the experience of the writer, the technique chosen matters little so long as it suits the individual needs. It has been customary to advocate a column of fluid of 200 mm., which

* A paper read at the Sixty-fourth Annual Meeting of the Canadian Medical Association at Saint John, N.B.

demands a considerable volume of blood and necessitates veni-puncture but it is found, in actual routine work, that the puncture of a vein is rather worrying to nervous patients and that the need to prepare a sufficient number of syringes is apt to impose a limit on the number of observations possible in the course of routine work. A micro-method is therefore preferable. The essential points to take into consideration are as follows.

1. The citrate solution should be of standard strength, 3.8 per cent.
2. The proportion of blood to citrate solution should be that originally chosen by Fahraeus, 4 volumes of blood to 1 of citrate.
3. The sedimentation tube should be kept vertical at approximately standard temperature, room temperature being a fairly good one and quite steady enough for comparative routine tests.
4. The readings should be made at accurately-timed intervals. It has been found that the most valuable reading is that at one hour, but a standard 5 hour reading has also been of great use.
5. The results should be recorded as a percentage, whatever the height of the column used. It is most convenient to express the reading as the percentage of "clear serum" to the total height of the column of fluid.

Various improvements have been suggested in recent years by which the accuracy of the sedimentation test can be increased. It would certainly be an improvement to keep a special incubator for the test, preferably kept at a temperature of 22° F. This, however, would involve doing all the tests in the laboratory or where ever the incubator was installed; but it is a great advantage to be able to set up the test in the ward or in the patient's room and, for this reason, and because the actual difference is small, the writer prefers to work at room temperature, even though he realizes that the temperature of a room is only regulated within the limits of comfort. Rees Walton in an excellent paper (*The Quarterly Journal of Medicine*, 1933, **2**: 78), which should be studied by all interested in the test, has demonstrated that the rate of sedimentation depends on the number of erythrocytes per c.mm. of the blood. He chooses a strength of 5 million as the optimum and regulates the number in the sample of blood for testing by adding or subtracting the requisite amount of plasma, so as to bring the total red cell count up to the optimum. This involves the dividing of the sample into two parts, one for counting and testing and the other for centrifugation, in order to provide plasma for dilution if necessary. The writer has ascertained, in numerous counts, that the number of erythrocytes does not vary much in pulmonary tuberculosis and, while fully accepting the findings of Rees Walton as to the importance of the number of red cells, is still convinced of the practical value of a sedimentation test done on the assumption that the red cell count is not far enough removed from 5 million to matter.

The technique employed is a simple one, involving only so much blood as may be obtained by finger puncture. The four volumes of blood are drawn up into a capillary pipette, on the barrel of which a "volume" has been marked off with a grease pencil, and one volume of citrate is taken up also, each volume being separated from the previous one by admitting an air bubble. The five volumes are now blown out on the paraffined slide and mixed thoroughly. By means of suction through a short length of fine rubber tubing, a column of the citrated blood is now drawn up into the sedimentation tube, the height of the column being about 7 cm.; and the narrowed end of the tube is sealed off in the flame so that there shall be no further movement of the column. The tube is now set up vertically in a rack made for the purpose, the time being noted, and the exact height of the column read on a transparent millimetre scale. After one hour, the proportion of "clear" plasma overlying the column of settled blood cells is read off, reduced to a percentage of the total column of fluid, and recorded. The sealed end of the sedimentation tube is now cut off with a file, the rubber tube is reapplied, the contents are blown out again on to a paraffined slide, well mixed, and, by means of a capillary pipette, one volume of the citrated blood added to seven volumes of a 3 per cent acetic acid solution, thus making a strength of 1 in 10 of the original blood in which the red cells have been laked by the acetic acid. This preparation is used for counting the total number of leucocytes in the patient's blood, Medlar having proved that this determination is of great importance in summing up a case of

TABLE I
BLOOD SEDIMENTATION TESTS

[Read after five hours]
State of patients two years after the tests

1929 "Clear" percentage	1931 Dead	1931 Alive	Total	1931 Dead percentage
61 and over	29	9	38	76.3
60–51	22	19	41	53.6
50–41	4	13	17	23.5
40 and under	0	3	3	0.0

tuberculosis. It should be added that the sedimentation tubes used by the writer are drawn out of a selected type of barometer tubing and narrowed at one end to a convenient bore for sealing in the flame. The internal diameter of the barometer tubing is approximately 1.25 mm.

To show the prognostic value of even a single record of this kind, the result of a "follow up" of tested cases is shown in Table I. These results are based on the subsequent fate of 100 sputum positive cases of pulmonary tuberculosis tested in 1929 and enquired after in 1931. The tests shown in the Table were read at 5 hours so as to be able to carry out a large number of tests on the same morning, put them aside, and read them in the afternoon, but the writer now carries out all his readings at 1 hour. The value of the total leucocyte count as an index in prognosis may be judged from Table II, based on the fate, two years after testing, of the same 100 patients. From this Table, the truth of Medlar's observation that a large proportion of cases of severe tuberculosis show a "septic" type of leucocyte count may be appreciated, no less than 54 per cent of the patients having a total leucocyte count of 15,000 or over. It may be added that this leucocytosis was, as postulated by Medlar, for the most part a polynucleosis. The formidable significance of a very high leucocyte count is apparent from the Table.

TABLE II
TOTAL LEUCOCYTES

State of patients two years after leucocyte enumeration				
1929 *Leucocytes per c.mm.*	1931 *Dead*	*Alive*	*Total*	*Dead percentage*
Over 20,000	18	4	22	81.8
20,000–15,000	17	15	32	53.1
15,000–10,000	15	14	29	51.7
Under 10,000	6	11	17	35.2

THE ARNETH-VON BONSDORFF COUNT

The modification of the Arneth technique found most convenient by the writer is that of Von Bonsdorff, which is extremely simple and depends upon a count of the number of nuclear divisions in 100 polymorphonuclear leucocytes. Naturally, if the average polynuclear had three nuclear divisions, the Von Bonsdorff count would be 300 or if the average were two divisions, it would be 200. In the writer's experience the normal for good health is about 250 but he takes the limit of normality as low as 225. In pulmonary tuberculosis, the number is seldom above 200 in the active case except as the result of good resistance or efficient treatment. Here, however, the personal equation of the enumerator comes into play, and it is necessary to come to a definite understanding with one's pupil or one's assistant as to what shall be accepted as a nuclear division. The rule by which the writer is guided is that complete separation, or such a close approach to complete separation that the nuclear lobes are only united by a thread, is accepted as constituting a division of lobes, but that where the lobes are joined together by a ribbon-like bridge they shall be counted as one. For successful enumeration, only a well made blood film, with both edges well on the slide, will serve, as in poor films the nuclei get superimposed and cannot be distinguished. It is better, in case of doubt, to count the divisions as two rather than as one, as three rather than as two, thus weighting the scales in the direc-

TABLE III
VON BONSDORFF TEST

State of patients two years after the tests				
1929 *Number of nuclear divisions in 100 polymorphonuclears*	1931 *Dead*	*Alive*	*Total*	*Dead percentage*
125 and under	18	6	24	75.0
126–150	29	17	46	63.0
151–175	9	17	26	34.6
176 and over	0	4	4	0.0

tion of normality and affording greater significance to deviations from the normal. Some may prefer Schilling's method of "hæmogram" record, but the method of Von Bonsdorff has given such valuable results in the hands of the writer that he does not propose to alter his practice. The result, so far as it concerns prognosis, may be gathered from Table III, in which the significance of the Von Bonsdorff count is shown in the same 100 cases dealt with in Tables I and II. The severity of the cases concerned may be gauged by the fact that no less than 70 per cent had less than 150 nuclear divisions, a fact which points to the prevalence of very young forms of polymorphonuclears in the circulating blood, and suggests the using up of many of these phagocytes.

There remains the lymphocyte-monocyte ratio, based upon the counting of 100 mononucleated cells. It is claimed by Medlar that a marked increase of lymphocytes goes with improvement,

and that a marked increase of monocytes indicates that there is a building of new tuberculous tissue somewhere in the body. The beautiful experimental work of Sabin on artificially infected rabbits gives complete confirmation of the clinical deductions of Medlar, or perhaps it might be more accurate to say that the clinical findings of Medlar confirm for man the experimental observations of Sabin, as the latter, I believe, was the first to establish the importance of these cellular changes. Here again the writer has made concessions to the practical difficulties of clinical work and, instead of applying the more accurate method of "vital staining" to the problem, has contented himself with enumeration of cells in dry films differentiated by means of Leishman's stain. It may be added that Leishman's stain is admirably suited to the purpose, affording a sharp contrast between the clear blue of the cytoplasm of the lymphocytes, large and small, and the dull ground-glass cytoplasm of the monocytes. The writer has no intention, at this point, to discuss the difficult question of the origin of the monocytes, but he may be permitted to associate them, at least from the clinical point of view, with the so-called epithelioid cells of tuberculous tissue and to express his agreement with the views of Medlar as to their clinical significance. Table IV has been compiled from the records of the 100 cases already referred to, and gives a striking idea of the importance in prognosis of a marked excess of monocytes over the normal. It may be said that, in a perfectly normal person, the ratio should be about 90 lymphocytes to 10 monocytes but, as the variation in health may be considerable, the writer takes 80-20 as the limit of normality in attempting to interpret his

TABLE IV
LYMPHOCYTE–MONOCYTE RATIO

State of patients two years after the tests

Monocytes per cent of non-granular cells	*Dead*	*Alive*	*Total*	*Dead percentage*
40 and over	15	2	17	88.2
40–31	17	13	30	56.6
30–21	21	21	42	50.0
20 and under	2	9	11	18.1

counts. It has been stated above that an integration of these blood tests gives a better idea of the state of a case than any one of the tests by itself. In the few tabular records which follow only three of the tests are dealt with, as the total leucocyte count had not been calculated in every case and so is left out of consideration for the moment. Its importance, though great, is, perhaps, less than that of the remaining three, for the reason that it tells much the same story as the lymphocyte-monocyte ratio, a point which may be verified by comparing Tables II and IV.

Table V is introduced to illustrate the point that in advanced cases on routine treatment in hospital the apparent amelioration which nearly always follows admission and the rest, good food and freedom from domestic anxiety which goes with institutional regime, is not so real as might be judged by the usual criteria of improvement in temperature, weight and general *bien être*. The blood findings in four bad cases of pulmonary tuberculosis shortly after admission, and again some months later, are charted and serve to show that, although the patients felt better and looked better, and while the temperature chart pointed to an amelioration, the actual state of the case was one of slow deterioration, masked by favourable changes of a purely general, as opposed to a lesional, kind. The blood findings in a sputum-negative case, admitted for observation, are set out as a contrast. It should be added that blood tests often show a real improvement under so-called routine treatment, which is, when well regulated, a very important variety of specific therapy. The cases shown in Table V have been selected to illustrate a point and are not by any means typical of

TABLE V
FOUR PATIENTS ON ROUTINE TREATMENT

Patient	*Date*	*Sed.*	*V.B.*	*L.-M.*
Mrs. A.	11- 7 -32	68.9	160	76-24
	12-12-32	72.5	149	72-28
Mrs. D.	18-10-32	51.6	193	66-34
	15- 1 -33	40.0	193	64-36
Miss E.	10- 7 -32	69.0	170	80-20
	20-10-32	58.6	158	66-34
W.W.L.	27- 5 -32	43.8	194	70-30
	13-10-32	39.1	151	73-27
Control H.M.	15- 6 -32	7.0	246	90-10
Sputum	19- 7 -32	5.0	234	88-12

Illustrating gradual deterioration

the results of routine institutional treatment in more favourable cases. These records, however, serve to show how an integration of the tests may help in appreciating the condition of patients before and after treatment. The writer has used this method of following the results of sanocrysin treatment in a rather large number of cases and has convinced himself of the real value of this form of gold therapy by these

means, among others. It will suffice for the purpose of this paper to show the results of blood tests during two successive courses of sanocrysin treatment in a severe advanced case with cavitation and infiltrative processes in both lungs, in a young man of 21 years old. These are set forth in Table VI. It will be observed

TABLE VI

H.R. SANOCRYSIN

	Date	*Sed.*	*V.B.*	*L.-M.*
First course	6-11-31	50.0	165	67-33
	15- 4 -32	16.4	194	90-10
Second	21- 1 -33	30.0	168	55-45
course	20- 4 -33	20.0	200	82-18
Relapse	25- 4 -33	17.0	200	68-32
pleurisy	18- 5 -33	19.0	167	70-30

that the patient underwent great improvement as a result of the first course. Unfortunately he left the sanatorium, to which he had been sent for grading, before he was fit and against advice, and, failing to get a job, "took to the road" and tramped Wales for some months, returning to hospital the following year in a severe relapse. The second course of treatment was, again, very successful up to a point, but, as the lymphocyte-monocyte test on 25-4-33 suggested in advance, there was trouble brewing and an attack of pleurisy developed at the left base. The loss of health is clearly indicated in the blood tests on 18-5-33.

The successive records in the case of a young university man aged 26, are given in Table VII, showing the irregularities in the blood picture whilst the patient was at home, and the subsequent relatively steady condition following the induction of artificial pneumothorax. It

TABLE VII

CASE D.M.

	Date	*Sed.*	*V.B.*	*L.-M.*
Before A.P.	24- 4 -32	19.3	186	74-26
	8- 5 -32	24.3	193	74-26
After A.P.	1-11-32	8.0	214	80-20
	12-12-32	7.0	225	77-23
	8- 1 -33	13.0	235	85-15
	6- 2 -33	8.0	224	75-25
	20- 2 -33	10.0	245	70-30
	18- 4 -33	6.0	221	85-15

D.M. effects of artificial pneumothorax

was observed, however, that there were minor fluctuations which appeared to be associated with the period of time elapsing since the last refill, and, as the patient experienced marked headache and even some pyrexia after his refills on some occasions, it was decided to carry out a blood examination the day before and the day after a refill. The result of this is shown on Table VIII, and it may be stated to avoid any possibility of bias, the counts were made with the slides marked with a letter so that the writer, in counting them amongst a batch of others, was quite unaware of what film he was enumerating.

TABLE VIII

CASE D.M.

	Date	*Sed.*	*V.B.*	*L.-M.*
Before refill	31- 5 -33	9.0	226	83-17
After refill	2- 6 -33	13.4	211	75-25

Effects of a refill; suggesting residual activity.

The blood shows, after the refill, a slight deterioration in all three tests, proving, to the satisfaction of the writer, that there is still some residual activity in the lung focus which is brought to light in the form of an auto-inoculation under the pressure of the refill. The instance is quoted as it illustrates how useful these tests may be in guiding the treatment of patients who, judged by the more usual criteria, might be regarded as getting on very well.

It may be contended that the rough and ready methods used are capable of refinement, and that the writer, instead of demanding more accurate technique and more laborious methods, is retarding progress by his easy improvisations. His answer would be that, while he is most anxious to see better methods so simplified as to be as readily applicable as those now advocated, he regards the changes sought for as so marked that a very high degree of accuracy is not worth purchasing at the expense of clinical applicability. Schilling, speaking of his "hæmogram," expresses the same view which is here quoted. "One will soon recognize," he writes, "the uselessness of exaggerated exactitude. Blood or organ preparations do not yield exactly the same results, as, for instance, when blood is obtained several times from the same puncture or several direct preparations are made from the same tissue section. A mathematically exact determination of the 'actual' leucocyte count is an impracticable dream. For clinical purposes, an approximate enumeration is sufficient, guarding against gross mistakes by adequate care."

DISCUSSION

It is not proposed to discuss in any detail the evidence at present available as to the physiological significance of these blood tests.

For practical working purposes it suffices to remember that the increased rate of red cell sedimentation appears to be associated with the presence in the blood stream of products of cellular destruction; that the leucocytosis may be taken to indicate a demand for more phagocytes; that the Von Bonsdorff test, when the number of nuclear divisions is unduly low, suggests that the call for polymorphonuclears has led to the entry of young, immature forms into the blood stream; and that the increase of lymphocytes goes with the successful neutralization of a toxic process. The increase of monocytes, on the other hand, is evidence, in cases of tuberculosis at least, of a spread of the process and the formation of new tuberculous tissue. These remarks all refer to the significance of these tests in cases of tuberculosis. Stress must, however, be laid on the fact that not one of these changes is, in itself, characteristic of tuberculosis and that each must be regarded as of comparative value only. The sedimentation rate, for instance, alters under certain physiological conditions, being markedly increased during pregnancy and altered, to a less extent, in menstrual periods, while the sedimentation rate, the Von Bonsdorff count, and the total number of leucocytes, undergo the same kind of alteration in acute septic processes as they do in tuberculosis. The writer has encountered a very marked increase of monocytes in malignant disease, also in diseases depending on streptothrix infection, and in a case associated with an apparently non-pathogenic (for animals) acid-fast bacillus. In other words, these tests are of little or no value in diagnosis when taken by themselves. There may, however, be a future for them in the diagnosis of tuberculosis when applied shortly before and shortly after a small dose of tuberculin given subcutaneously, as suggested by Rees-Walton in the paper already referred to. It is, however, in the assessment of the constitutional state of the patient, from time to time, during the course of treatment, that these tests have their real value. All who have worked at the treatment of cases of tuberculosis have felt the want of some test more delicate than the routine observations of temperature, weight, and general well-being, to guide the decisions which have to be taken as to fitness for a higher "grade" in sanatorium therapy or fitness for a return to work. The experience of the writer is that, by a careful integration of the four tests here referred to, a rather delicate method of appreciation of the constitutional state, for the purpose of such decisions, is available. With Pottenger, the writer holds that the essential factor in tuberculosis is the allergic state, and that each step in the progress or regress of an individual patient depends upon the size, frequency and kind of the auto-inoculations to which the patient is subject, as well as on the power of the patient to counteract these auto-inoculations or his failure to do so. The power of the blood to cope with the situation represents the resultant of the toxic processes on the one hand and the defensive efficiency on the other, and it is this resultant which is reflected in the responses to the tests described.

LONGEVITY AFTER CORONARY THROMBOSIS.—To illustrate the longevity and physical activity possible after acute coronary occlusion, Paul D. White presents the case of a man who died of apoplexy at the age of 80 and showed at necropsy a firm scar in the heart muscle resulting from the healing of an infarct which occurred seventeen and one-half years before. The heart was otherwise in good condition anatomically and so sound functionally that ten years after the heart attack the patient was able to climb a mountain at fast pace without symptoms, at the age of 73 years. The three points of especial interest and importance in the case are (1) the patient's longevity, for he survived the acute coronary thrombosis by seventeen and one-half years and lived to the ripe old age of 80 years in spite of it; (2) that when the patient did finally die, his death was not due to heart disease, but to cerebral hæmorrhage, and (3) that for many years after the coronary thrombosis the patient was much more strenuous physically than the great majority of men of his age who have no heart trouble at all, and even when he approached his eightieth year was able to walk 5 miles a day without trouble if he did not hurry or climb hills. This is a case which may serve not only to demonstrate the wonderfully recuperative power of a seriously injured heart muscle, but also to put hope into the breasts of the many victims of coronary thrombosis, who, having recovered from their acute attacks, still live in dread, waiting for the sword of Damocles to fall in the shape of a second and fatal attack.—*J. Am. M. Ass.*, 1933, **100:** 233.

God and the doctor we alike adore
When on the brink of danger, not before;
The danger past, both are alike requited,
God is forgotten and the doctor slighted.
—*Euricius Cordus*

THE PRACTICAL APPLICATION OF OUR KNOWLEDGE OF THE BILIARY SYSTEM*

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THE year 1932 marked the fiftieth anniversary of the first cholecystectomy. On July 15, 1882, at Berlin, Germany, this operation was performed by Carl Langenbuch.[1] Langenbuch was an experimental as well as a practical surgeon. He published a work on "Surgery of the Liver and Gall Bladder," and made the significant observation that "the gall bladder was removed not only because it contained stones but because it was the type of gall bladder in which stones would reform."

Since the time of Langenbuch, and particularly during the past few years, the advances in our knowledge of the physiology and operative surgery of the liver and biliary passages have provided new bases for the rational treatment of diseases of these organs. At the same time these advances have provided a new mode of approach to the problem. The study of the diseases of the biliary system has been too long a stereotyped performance, as it has considered the components of the biliary system independently, and has thereby failed to secure a comprehensive view of the hepatic system as a whole. In this presentation, we wish to reflect if possible the trend of the recent advances in this field, in the light of which disorders of various parts of the biliary tract are considered in relation to the hepatic system as a whole.

THE INCIDENCE OF BILIARY TRACT DISEASE

Biliary tract disease is an exceedingly common disorder. An index to its relative frequency is provided in the observations made by Crump.[2] In a study of 1,000 necropsies at the City Hospital, Vienna, as they came to the post-mortem table, with no attempt at selection of the cases, he found that cholecystopathy occurred in 59.6 per cent of all cases, increasing from 20 per cent in the lowest age group to 77.6 per cent in the eighth decade. Stones were present in 32.5 per cent of all cases. Pathological conditions of the biliary tract were found in 41.3 per cent of all cases. Stones in the bile ducts were present in 24 per cent of all cases of cholelithiasis; that is, patients with gall stones had a one in four chance of having stones in the common duct. Sixty per cent of all common duct stones were found near the ampulla of Vater.

EMBRYOLOGY

The importance of considering the biliary system as a whole is emphasized by its embryological development. It has been established that the gall bladder is formed from the group of primitive cells which give origin to the liver, pancreas, stomach, and duodenum. This fact also emphasizes the intimate relationship between the gall bladder and the adjacent structures of the gastrointestinal tract.

THE PHYSIOLOGY OF THE LIVER

From a physiological standpoint the liver is probably the most complex organ in the body. Its functions are at best imperfectly known. Certain of them, however, have been fairly accurately established.

1. The functional activities of the liver are carried on by two distinct groups of cells: (a) hepatic cells which control glycogen metabolism, the formation of urea and bile salt metabolism; (b) stellate or Kupffer cells, which are part of the reticulo-endothelial system, and are concerned with the bilirubin and cholesterol cycles, and take part in the regulation of the blood elements. It follows that inflammation of the liver substance or obstruction of the biliary passages, with consequent damage to liver tissue, will interfere with the activity of these cells. Biliary surgery therefore is aimed not at removal of the gall bladder alone, but its prime purpose is to permit these two types of cells to regain their function. In dealing with the gall bladder, the primary axiom should always be kept in mind that disease of this

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viscus is contributory to biliary tract disease, which in turn interferes with the economy of the liver as a whole.

2. The liver has a high power of regeneration. Mann has shown that after removal of one lobe, the lobe may be completely regenerated and after a few weeks may be as large as before operation.

3. The liver has a large reserve. Judd[3] states that the hepatic structure may be reduced to 15 per cent of the normal and yet will carry on its function normally if the animal is kept on a carbohydrate diet (milk and syrup). If protein is fed, the animal develops cirrhosis with ascites and dies.

4. *Carbohydrate metabolism.*—Glucose reaches the liver by way of the portal vein. Part of this glucose is at once used for bodily consumption, part is stored as glycogen. With the need for more glucose, glycogen is hydrated and converted to glucose. The liver is the principal storehouse for this glycogen. The liver also can form sugar from amino-acids. The liver is further responsible for the maintenance of blood sugar at the correct level. Mann[4] removed the liver from the circulation by means of an Eck fistula. Following this the animal developed progressive hypoglycæmia and died. During the period of hypoglycæmia the muscle glycogen was slightly reduced; even at death, however, the amount of muscle glycogen, if mobilized to glucose, was sufficient to maintain the blood sugar at the normal level, showing that synthesis of glucose was wholly dependent on the liver.

5. *Protein metabolism.*—The liver is the sole site for the formation of urea and is intimately associated with urea excretion. When the cells of the liver have been severely damaged a toxin apparently is evolved which produces renal insufficiency, suppression of urine, and death from uræmia. This sequence of events constitutes the syndrome called by some writers "liver death" and by others "cholæmia."

6. Whipple and Hurwitz,[5] and as well Mann, have shown that liver injury causes marked lowering of the plasma fibrinogen, which clinically accounts for bleeding in hepatic disease.

7. *Necessity for bile salts.*—It has been shown experimentally that if all the bile is lost by drainage to the outside through a fistula the animal will die in a few weeks. This is due to the loss of bile salts which are essential to liver function, the hepatic cells being more efficiently stimulated to secretion by bile salts than by any other substance.

PHYSIOLOGY OF THE GALL BLADDER

There is no established opinion regarding the function of the gall bladder. Theories indicate that it serves at least three purposes—concentration of bile, equalization of biliary pressure, and bile storage. None of these functions, however, plays any essential part in the body and, in the light of our present knowledge, has no clinical significance. In this respect, surgically, the gall bladder may be compared to the appendix. The gall bladder assumes practical importance because it may become the centre of infection or the site of gall stones, both of which disturb the biliary tract and the function of the whole liver.

THE FORMATION OF GALL STONES

1. *Cholesterol stones.*—Many theories have been advanced regarding the formation of cholesterol stones. Andrews[6] and his coworkers recently have given the most reasonable explanation of this phenomenon. Normal cholesterol is held in solution in the bile in a loose chemical combination with the bile salts; the proportion, while varying in different subjects under a variety of conditions, would appear to be about 13 of bile salts to 1 of cholesterol. Andrews has shown that cholesterol is not secreted by the gall bladder. Normally the gall bladder wall is impermeable to bile salts. The diseased gall bladder wall, however, permits dialysis of bile salts outward, allowing the cholesterol to be concentrated to the point where precipitation takes place. The injury to the gall bladder wall is caused by the action of bacteria or other toxic agents. Stasis alone does not result in stone formation. Further, the presence of stones means a diseased gall bladder. In the words of Lahey's pithy aphorism, "There are no harmless gall stones."

2. *Calcium carbonate stones.*—Phemister[7] *et al.* have recently demonstrated that obstruction to the cystic duct with a chronic inflammation of the gall bladder is essential to the formation of calcium carbonate stones. Calcium is excreted by the gall bladder wall and is precipitated when the calcium and carbonate ions exceed the solubility constant.

In the light of the above facts, it can readily

be understood how mixed stones may occur in the gall bladder.

LYMPHATIC RELATIONS

Graham,[8] by gall bladder and portal system injection, has shown that there are two sets of lymphatics, those in the portal spaces and those in the liver capsule. He has further demonstrated that hepatitis is a constant accompaniment of cholecystitis, and that this hepatitis is most marked in the right lobe. He believes that cholecystitis is most frequently due to the spread of infection from the liver to the gall bladder by way of the lymphatics. According to his view, infection from a lesion of the portal system, such as appendicitis or peptic ulcer, spreads to the liver, causing a hepatitis, and thence to the gall bladder.

In this same connection Kodama[9] with injection experiments has shown that lymph from the liver, gall bladder, duodenum, pancreas, and the first portion of the ascending colon, drains into the portal mesenteric lymph gland at the beginning of the portal vein. He has further demonstrated a direct communication between the lymphatics of the first portion of the duodenum and the gall bladder wall. These observations, pointing to a close relationship between the structures in the sub-hepatic area and the liver itself, are of great clinical importance.

LABORATORY PROCEDURES

In an examination of a patient with biliary tract disease there are certain circumstances under which liver function tests are of value. The tests of liver function commonly used are the van den Bergh tests, icterus index, dye excretion test, biliary drainage, and the blood coagulation time. In our experience the first two and the last are the most practical in their bearing on biliary surgery. Whatever may be said of the technical limitations of the van den Bergh test, it is of value in differentiating the hæmolytic from the obstructive type of jaundice. The icterus index has its chief value in clinical jaundice, fluctuations in the level of the jaundice indicating stone. It is also of use in detecting latent jaundice. The blood coagulation time is essential in dealing with any case of jaundice. None of these laboratory procedures equals in value similar studies of kidney function, but in certain cases may be of great practical importance.

CHOLECYSTOGRAPHY

This procedure was introduced in 1924 by Graham and Cole and has increased greatly the accuracy of diagnosis of biliary tract disease. The test depends on three known functions of the gall bladder—storage of bile, concentration of bile, and expulsion of bile on demand into the duodenum.

In a diseased gall bladder containing stones, cholecystographic evidence is positive up to 80 or 90 per cent of cases. In a diseased gall bladder without stones, its accuracy is not so great. It should always be remembered that the cholecystographic findings may be normal and yet the gall bladder contain stones.

Certain conditions in the abdomen may give a positive cholecystogram. Some of these are an enlarged liver due to cirrhosis or passive congestion, jaundice, ascites, pregnancy after the fifth month, malignant disease in the right upper quadrant, and colitis (irritable colon). In connection with the last-named condition, Lahey quotes 65 cases showing a positive cholecystogram in which after a course of medical treatment directed towards a colon disorder 44 per cent showed a normal gall bladder shadow.

There is need for great care in the interpretation of normal cholecystograms in patients who clinically appear to have gall-bladder disease. In addition Graham has repeatedly pointed out the tendency to error when a diagnosis is made on the faintness of the gall bladder or on its size and shape. Finally, as with all laboratory studies, cholecystography is of value only when correlated with the clinical findings.

CRITERIA OF DIAGNOSIS

With the facilities of cholecystography, and with our increased knowledge of the physiology of the biliary tract, most writers feel that satisfactory results after cholecystectomy should be secured in 90 per cent or over of all patients with biliary tract disease. The greatest number of unsatisfactory results appear to occur in the non-calculous gall bladder. In order to achieve these results it is essential to have in mind definite criteria of diagnosis, for four reasons: (1) to crystallize the essential points in the history, bearing in mind the fact that chronic cholecystitis is not typified by any classical group of symptoms; (2) to secure the full value of cholecystography it is essential that its results be correlated with the clinical

findings; (3) to rule out the most common thing that masquerades as gall bladder disease —colitis; and (4) to rule out other pathological conditions in the abdomen.

The success that has been obtained in the diagnosis of peptic ulcer has been due to the general recognition of certain definite criteria. Similarly we are now in a position to formulate and use just as efficiently criteria for the diagnosis of biliary tract disease.

The necessity for such criteria is further evidenced by a survey of the literature dealing with follow-up reports, in which failure to obtain relief after operation for chronic cholecystitis is due in most cases to incomplete or wrong diagnosis. These studies also show that the results after operation have been unsatisfactory in those cases where conspicuous clinical symptoms were absent, many such cases being operated on on the basis of x-ray diagnosis alone.

We have formulated the following criteria which, if fulfilled, justify a diagnosis of biliary tract disease.

1. A history of a continuous disability characterized by flatulence, nausea, right upper abdominal pain, and abdominal distress within one hour after eating.
2. Physical examination—the finding of tenderness under the right costal margin.
3. Laboratory and roentgen-ray—
   (a) Positive cholecystograms.
   (b) Gastric analysis showing anacidity or hypoacidity.
   (c) Icterus index (over 10 indicating latent jaundice).
4. Symptoms persisting in spite of careful medical treatment.

In our own experience we have found the above criteria of great practical value in assessing the symptoms and accurately diagnosing the case of so-called "flatulent indigestion," which has always presented clinical difficulties. The salient points in the history in true cholecystic disease, which even after the closest analysis is often vague, would seem to be a continuous disability as opposed to the periodicity of ulcer distress, and pain, which to be of diagnostic value is referred to the upper abdomen. We have found that not more than 20 per cent of patients give a history of gallstone colic. Physical examination yields one point of value—the finding of localized tenderness under the right costal margin. This tenderness is of even greater importance and can be more accurately ascribed to the gall bladder if it is elicited with the patient in the sitting position. With regard to laboratory and roentgen-ray procedures, the essential points in the interpretation of the cholecystogram have already been discussed. Gastric analysis is of relative value only. In cases with biliary tract disease there is nearly always hypoacidity or anacidity. Dowling[10] has reported a hypoacidity in nearly 70 per cent of his cases. Akaiwa and Sugano[11] have found the acid below normal in 77 per cent of their cases. The icterus index may prove of great value in determining a degree of bilirubinæmia which cannot be detected by clinical examination. Finally, in doubtful cases, a course of medical treatment may be instituted. If the disability persists one is then justified in assuming the presence of actual disease in the biliary tract which has always been recognized as being particularly refractory to any form of medical treatment.

SPECIAL POINTS IN DIAGNOSIS

1. Cholelithiasis.—Patients with typical gallstone colic require no discussion and should be submitted to early operation because the sequelæ of long standing gall stones are many and serious. In our experience the most suggestive point in the history indicating cholelithiasis is the residual tenderness over the gall bladder region after the attack has passed.

2. A history of jaundice in itself is not of great importance unless associated with gallstone colic.

3. The condition most commonly confused with gall bladder disease is a functional disturbance of the colon. This type of disturbance is also frequently associated with gall-bladder disease. It follows that the most important thing to keep in mind in differential diagnosis is a colon disorder, and during the period of convalescence treatment should be directed towards relieving the colon condition.

4. In cases of jaundice the coagulation time of the blood must be estimated.

5. In patients over fifty years of age, if there is any suspicion of vascular disease, it is important to secure pre-operatively a renal function test.

6. It is important to keep in mind the association of gall bladder disease with peptic ulcer. In a series of 4,679 cases of ulcer of the stomach and duodenum, Eusterman[12] of the Mayo Clinic

found that 8.5 per cent had associated gall-bladder trouble.

7. Finally, in estimating criteria, a normal cholecystographic report may be disregarded if there is enough clinical evidence of disease present.

THE SURGICAL ASPECTS

Cholecystectomy is the operation of choice and should be performed except under very exceptional circumstances. There is general agreement that cholecystostomy has a limited field, the end-results being unsatisfactory.

Cholecystectomy should be performed as a single operation, and, with the possible exception of simple appendectomy, should not be combined with any other abdominal or pelvic procedure. In a group of cases reported by the Lahey Clinic[13] in which operation was performed for chronic cholecystitis the mortality rate was 3.4 per cent, whereas in a contrasted group in which the operation for chronic cholecystitis was associated with extra biliary operations the mortality rose to 9.1 per cent. Our own experience is in agreement with these findings, emphasizing the fact that the practice of combining other abdominal operations with that of cholecystectomy should be discouraged.

Common-duct stones. — Exploration of the common duct is a frequent necessity in biliary surgery and if one may judge from the current discussion of this problem is becoming a more frequent procedure. We should like to make several observations with regard to this problem.

1. Common-duct stones are much more frequent than previously supposed. In this connection the experience of Lahey[14] and his associates is illuminating. Up to 1926 in 619 gall-bladder operations they explored the common duct in 15.1 per cent of these cases, finding common-duct stones in 8.2 per cent. In 1927-28, 30.2 per cent had the duct opened with 13 per cent showing common-duct stones. In 1931 the common duct was opened in 41 per cent of the cases, with a discovery of stones in 19 per cent. By increasing, therefore, the frequency of opening the common duct the incidence of common-duct stones was more than doubled.

2. The exploration of the common duct does not increase the operative mortality or incidence of stricture. Lahey's mortality rate in gall-bladder surgery prior to 1926 was 5.4 per cent whereas in the past five years; exploring nearly three times as many common ducts, the mortality has been 2.2 per cent. It should be pointed out, of course, that the presence of common-duct stones is associated with a higher mortality when these cases are considered as a group, but this is not due to any added surgical risk incidental to the opening and exploring of the duct but rather to the fact that the duct stone has produced widespread changes in the liver.

3. The indications for exploration would seem to be the following:—dilated ducts, thickened and contracted gall bladder, pancreatitis, presence of stones in the gall bladder, and a history of repeated attacks of jaundice. In this connection, however, it is interesting to find that Lahey noted an absence of jaundice in 39 per cent of the cases in which he found common-duct stones.

4. It should constantly be kept in mind that stones may occur in a duct which appears and feels normal.

The apparently normal gall bladder.—When confronted at operation by an apparently normal gall bladder, what procedure should one follow? In the light of the experience of most observers it would seem to be a sound policy that if the definite criteria of biliary tract disease, as stated above, have been present the gall bladder should be removed.

Liver death.—Brief mention should be made of a condition which is attracting attention and causing increased comment and which is responsible for many of the deaths in operations for cholecystitis associated with common duct stones. This is a syndrome associated with shock, high temperature, and urinary retention, leading to death, apparently due to liver failure or so-called "cholæmia." In the experience of most observers the use of dextrose both pre-operatively and post-operatively has been the most successful form of direct treatment. It has been suggested by Mann that suturing of the liver around the hepatic fossa may cause hæmorrhage and death of liver cells producing sufficient toxic products to initiate this condition.

PRE-OPERATIVE AND POST-OPERATIVE CARE

It has been our experience that increasing attention to the pre-operative preparation of the patient has yielded striking results in a

smooth post-operative course and in a reduction of the mortality. Such preparation includes a preoperative period of hospitalization of at least 48 hours; an estimation of renal function in doubtful cases or in any patient over fifty or in cases of jaundice; the use of the procedures laid down by Walters in jaundiced patients; a high fluid intake. Particularly, however, is it important to give these patients large amounts of glucose pre-operatively, which can be done quite satisfactorily by mouth. This use of glucose provides the hepatic cells with a generous glycogen storage, which minimizes the possibility of post-operative disturbance of the acid base balance, tends to prevent the occurrence of liver failure, and, as shown by Bollman,[15] greatly increases the detoxifying action of the liver.

In connection with post-operative care Graham[16] has instituted the use of calcium with good results. This practice, he states, is based upon the work of Lamson, Minot, and Robbins,[17] who observed a marked acceleration of hepatic repair after poisoning with carbon tetrachloride, when the animals were given small amounts of calcium chloride.

THE MEDICAL ASPECTS

The necessity for post-operative medical treatment.—Cholecystectomy should be looked upon only as the first step in the management of the case. Every case requires subsequent medical care in the way of diet, regulation of the bowels, and other measures to correct a disturbed gastrointestinal function. Removal of the gall bladder after all is only removal of the exciting cause; the results are reflex disturbances of the gastrointestinal tract which require medical care for their correction.

Further, medical treatment is frequently essential, owing to the coexistence of an irritable colon or a peptic ulcer. Other cases require correction of obesity, bad food habits, and general hygiene. It may fairly be stated that unsatisfactory results following the removal of a diseased gall bladder are due either to failure to recognize and treat a colon or peptic ulcer condition or to a failure to establish proper habits of diet.

The gall bladder and heart.—We should like to point out the necessity of keeping constantly in mind the association of myocardial disease and chronic biliary tract infection. Whether the development of the two lesions is a result of the constitutional make-up of the individual, or whether the myocarditis is due to the biliary tract infection is beside the point; the important thing is to recognize the connection in the practical handling of these cases. In discussing this problem, Willius has found that 54 per cent of cases of cardiovascular disease associated with gall stones were greatly benefited by the removal of the gall bladder.

The gall bladder in chronic arthritis.—The gall bladder is frequently considered as a focus of infection in chronic arthritis and is removed for this reason. There would seem to be little justification for this practice. In a recent study Hartung and Steinbrocker[18] found the incidence of gall-bladder infection no higher in a large group with chronic arthritis than in any other group of hospital admissions, and in no case was cholecystic disease a definite factor in the etiology.

CONCLUSIONS

1. It is essential that definite diagnostic criteria be employed in biliary tract disease. With the proper use of such criteria a high degree of success is now possible in the treatment of this disorder.

2. The gall bladder must always be regarded as only an associated factor in pathological disturbances of the biliary tract and the economy of the liver as a whole.

3. Cholecystography is of value only when correlated with clinical findings. A normal cholecystographic report may be disregarded if other diagnostic criteria of disease are present.

4. The condition most commonly confused with gall-bladder disease is a functional disturbance of the colon.

5. The practice of combining other abdominal operations with that of cholecystectomy should be discouraged.

6. Common-duct stones are much more frequent than previously supposed.

7. Careful pre-operative preparation of the patient for cholecystectomy is of the utmost importance, particularly with respect to the administration of glucose.

8. Cholecystectomy should be regarded only as the first step in the management of the case and should be followed by careful medical treatment.

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ACHALASIA OF THE CARDIA (CARDIOSPASM)

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ACHALASIA of the cardia is a condition in which the cardiac sphincter does not relax. Normally in deglutition, after the food bolus is thrust into the pharynx by the action of the tongue it passes through two sphincters, the upper, or crico-pharyngeal, and the lower, or cardiac, sphincter. Normally, when the peristaltic wave passes down the œsophagus, at the point at which the diaphragm is reached the cardiac sphincter relaxes and the bolus passes to the stomach.[1] In achalasia the food remains in the lower end of the œsophagus owing to a failure of relaxation of the sphincter. Distension of the lower end of the œsophagus results and an effort is made by the œsophagus to overcome the obstruction. The first result of this is hypertrophy of the wall of the œsophagus. This occurs chiefly in the circular muscle fibres which are increased both in numbers and size. Œsophagitis follows from the stagnation of food in the pouch, and this gives rise to a secondary spasm, completing a vicious circle. No condition of spasm exists in the cardiac sphincter itself, as no hypertrophy has been demonstrated. Hence the term "cardiospasm" is a definite misnomer.

When the height of the column of food exerts sufficient force, the resistance offered by the sphincter is temporarily overcome, so that a slight amount of food passes through to the stomach until the food level falls below the requisite height. The height of this column is usually about eight inches. The œsophageal sac is usually fusiform in shape at first, later becoming pear-shaped or flask-shaped, when pouching results from the retained contents. Later, when the elongation is greater it may even become S-shaped, owing to the increased length of the œsophagus from the weight of the sac. The pouch usually overlaps the right diaphragm. The dilatation begins at the upper surface of the diaphragm at the true cardiac sphincter.

The circumference of the largest recorded sac is 30 cm. The capacity of the œsophagus is increased, often to twenty times its normal.[2] The hiatus or cardiac sphincter opens sometimes fairly high on the left side of the pouch, depending on how much elongation has occurred. Further dysfunction of the sphincteric action results from the alteration in the line of force exerted by the column of food. Whereas in normal œsophagoscopy the hiatus opens and closes during inspiration, in achalasia it is always found closed.[3]

Zicker and Ziemissan, in 1877, devised means for recognizing the condition of achalasia of the cardia in the living, as heretofore it had only been verified post mortem. However, Purton, in 1821, is credited with performing the first œsophageal dilatation. Rosheim, in 1895, first studied the condition by œsophagoscopy, and, in 1897, Rumpel used radioscopy.

ETIOLOGY

The nervous control of the cardiac sphincter is derived from the vagus through Auerbach's plexus and the sympathetics. Auerbach's plexus lies between the longitudinal and circular muscle layers and is well developed, constituting nodal tissue very similar to the neuromuscular nodes of the heart. Section of the sympathetics allows relaxation. Section of the vagus allows unopposed sympathetic action and results in increased tone.[4] Hurst and Rake[5] claim that achalasia must be due to interference with the normal neuromuscular mechanism controlling the relaxation of the sphincter. In the majority of cases no demonstrable cause is found, and in these cases inflammation, degeneration, or syphilis of the nerve plexus of the sphincter,

similar to the mechanism of heart block, is to be suspected. Since this theory, which seems to fulfill all the postulates of true achalasia, has been advanced, other workers[6] have demonstrated well-marked inflammatory and degenerative changes involving Auerbach's plexus in the lower œsophagus.

SYMPTOMS

The patient usually has undergone various courses of treatment, with no definite diagnosis, over a period of years. He complains most often of discomfort in the centre of the chest, usually indefinite — discomfort rather than pain. He experiences the sensation of large mouthfuls, when swallowed, stopping below the lower half of the sternum. He endeavours to force food down by copious fluids, or strenuous swallowing. He will state that he can "get his food down better while standing." Swallowing becomes a conscious, not a subconscious, act, and there is marked discomfort after a meal. Solids sometimes are swallowed more readily than fluids. Eructations of gas with a very unpleasant odour occur at frequent intervals. Regurgitation of food rather than actual vomiting is significant. This may occur during sleep. It is out of proportion to the amount of food ingested just previously, for it often represents the expulsion of the contents of the sac. Mucus and saliva may be regurgitated in the morning from their accumulation during the night. Eating fresh fruits, frequently apples, or drinking ice-water, often brings on an attack. The patient may be actually conscious of the passage of food from the sac to the stomach. Increased salivation is common, as the salivary glands are usually enlarged. The breath is offensive and a bad taste is present in the mouth. Hiccough is frequent. There is a gradual impairment in the nutrition, but wasting is slow, owing to a certain amount of food passing through. The patient feels better after evacuating the sac and he often becomes quite expert at regurgitation and flushing the dilated œsophagus. The obstruction is usually precipitate in its onset. Intercurrent infection, nervous strain, and emotional upset may bring on an attack, and concomitant with release from the psychic disturbance the attack may terminate spontaneously, with complete relief of symptoms for a long interval. Owing to distension of the sac there may be cardiac or respiratory embarrassment. Substernal tenderness and burning from associated œsophagitis are frequent complaints.

DIAGNOSIS

The diagnosis can only be made definitely by the œsophagoscope and fluoroscope. With the former the mucous membrane shows greyish white, like a furred tongue. Ulceration, œdema and induration are frequently present. Under the fluoroscope the characteristic cigar- or pear-shaped dilatation shows with the hiatus opening from its left wall. The walls are smooth and fill evenly with the barium. After enough barium is introduced to overcome the resistance, a trickle is seen to run through the sphincter. The condition must be diagnosed chiefly from *traumatic stricture* and *malignancy*. It has been said of œsophageal obstruction: nine months—cancer; nine years—cardiospasm. If atropine allows the pouch to empty, this rules out organic stricture and aids in the diagnosis from spasm of the cardia.

TREATMENT

The treatment of achalasia consists in over-dilatation of the cardiac sphincter. In a number of cases in which the diagnosis is made early the passage of the œsophagoscope is not only diagnostic but curative, if introduced through the hiatus. With the early cases occasional success follows the passage of a stomach tube, but this should always be done under a fluoroscope. Plummer[7] has devised a series of graduated dilators which have met with wide-spread acceptance. They consist of graduated olive-tipped heads, attached to a flexible bougie, which are passed over a guiding thread. With the larger ones resistance is sometimes encountered at the upper pharyngeal narrowing at the crico-pharyngeal constriction, which may lead to errors in diagnosis. Dilatation may be taken up to No. 54, although No. 32 is usually sufficient. Over-distension will of course rupture the sphincter. Other types of dilators are the hydrostatic and the mercurial. The principle involved is the dilatation of a compartment just proximal to the tip of the dilator, the small bag being filled with the fluid after the head has been guided through the sphincter. The force exerted by the fluid introduced should be equal to a column of water 20 to 30 feet high (Plummer and Vinson[8]). Howarth has devised an instrument called a cardia dilator, the principle of which is based on sudden marked dilatation.

Freedenwald[2] says dilatation should not be over 25 mm. Failure to dilate from above is usually due to marked angulation of the lower portion.[9]

There is usually considerable pain associated with dilatation, although it may be delayed 24 to 36 hours. If pain does not occur with a hydrostatic dilator it usually means that the dilator has slipped into the stomach or into the œsophagus. Following dilatation there is usually dramatic relief immediately, and the patient can swallow food easily without discomfort. There are recurrences in about 25 per cent of cases with hydrostatic dilators. No effort should be made to pass any type of dilator without first having the patient swallow a thread of heavy linen or silk. This should be swallowed 24 to 48 hours before the dilator is to be passed and about 16 feet should be ingested. That it has properly passed through the hiatus and has engaged can readily be determined by a characteristic tug when an effort is made to withdraw it. Occasionally, as in the reported case, the thread will not pass through the sphincter but will lie coiled in the pouch. If engagement does not occur no alternative to a retrograde dilatation remains. This applies to approximately 25 per cent of cases (Jordan[10]). Retrograde dilatation has also been effective when repeated dilatations from above have not been curative. It consists of performing a gastrotomy, introducing the fingers through the cardiac sphincter from below, and dilating up to the point that four fingers may be inserted up to the distal interphalangeal joint. This gives a dilatation of 5 to 5½ inches circumference. The sac should always be washed out and evacuated before dilatation or operation.

Various operations have been devised. The most successful is termed Heller's operation, and has met with acceptance, particularly in Holland. It consists of dividing the circular muscle fibres of the cardiac sphincter—really a modified Ramstedt procedure. Plication of the dilated œsophagus is useless. Anastomosis of the sac to the cardia of the stomach has not been successful. Jordan reports that section of the vagus makes the condition definitely worse. After dilatation there may be a persistence of a fibrous ring at the site of the constriction. There is always a persistence of the œsophageal pouch. Freedenwald claims there is little or no diminution in the size of the sac, but fluoroscopic studies later usually show a fairly marked decrease.

After dilatation, considerable care in feeding must be exercised during the first week. Four feedings a day, of a pint of milk in which an egg is beaten up and sweetened, are all that should be given. The contents of the sac should be evacuated one-half hour after food is taken. It is noticed that gradually less gastric content is expelled with each evacuation, and when there is no residue the result is regarded as a cure. No pips, skin or vegetable fragments should be allowed for some time. Attention to the general health and search for evident factors that might be associated or causative are important. The antispasmodics should always be tried. Nux vomica is to be avoided. Atropine should be tried to the point of tolerance. Its value in cases of spasm of the cardia is established. Nitrites are occasionally of value. The avoiding of mental strain is important and will often result in complete alleviation of symptoms for a protracted period. If much œsophagitis is present oily substances are of value. Alcohol is strictly contra-indicated. Small amounts of food frequently, rather than three large meals daily, may prove of assistance.

CASE REPORT

R.D., a male, aged 43, complained of abdominal and substernal discomfort with marked flatulence and regurgitation, existing, with remissions, over a period of eight years. There was some loss of weight (162 to 119 lbs.), but he was able to continue his occupation. He was treated for "indigestion" for two years, at which time following emotional stress there was complete obstruction. Fluoroscopic examination revealed the true nature of the condition, and in 1927, under general anæsthesia, a hydrostatic dilator was passed. Following this procedure there was complete alleviation of symptoms until 1930. At this time he sought advice early, and under the fluoroscope dilatation was performed with a stomach tube. Again the patient experienced complete relief of symptoms until August, 1932. Then his trouble recommenced, with difficulty in swallowing, substernal burning and regurgitation. This time he did not seek medical assistance for three months. He was losing weight rapidly and stated "that everything he ate came back." Under the fluoroscope the barium meal was completely retained in the pouch and no trickle had found its way into the stomach even after long observation. Inhalations of amyl nitrite allowed a few very slight trickles to pass through the sphincter. He was given a heavy twist silk thread to swallow, but at the end of seventy-two hours no engagement had occurred. He was accordingly referred to the McGregor-Mowbray Clinic, Hamilton, for a retrograde dilatation. This was done and the cardiac sphincter over-dilated. The patient made an uneventful recovery with complete relief of symptoms. Six weeks later there was evidence of considerable obstruction again present, as the sac was emptying itself very slowly. This time a thread gained entrance to the stomach without difficulty and he was dilated up to No. 54 F, Plummer's dilator. After an interval of six months he has remained completely free from symptoms.

SUMMARY

1. "Achalasia," signifying a failure of relaxation of the cardiac sphincter, is the most significant name for the condition described.

2. A causative factor, apparently, is interference with the neuro-muscular control of the sphincter.

3. Treatment consists in over-dilatation of the sphincter by some form of dilator passed over a guiding thread.

4. If the thread fails to traverse the sphincter, retrograde dilatation is necessary.

5. An illustrative case report is presented.

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CERVICAL CANCER*

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X

IN spite of the apparent increase in the number of deaths from cancer of the cervix, the prognosis of this disease is better to-day than at any time in the past, and this is due to the increasing availability of radium as a therapeutic measure. Before Wertheim and Schauta devised the radical operation, cancer of the cervix was an almost hopeless disease. With the perfection of technique in this extensive operation the prognosis for the operable cases became much better, but the more advanced cases still remained hopeless. With the appearance of radium as a therapeutic measure, both palliative and curative, hope became available even for those in an advanced stage and the prognosis in the earlier cases was improved. The cervix offers one of the most favourable situations for the application of radium. It is easily accessible; a sufficiently large dosage may be applied without danger of serious damage to vital structures, and cross-firing is easily carried out. Consequently, the opinion that radium is the preferable method of treating carcinoma of the cervix is growing each year.

All workers are convinced that proper prophylaxis can reduce the incidence of cervical cancer. Nearly every case is found in a cervix which has been the seat of chronic cervical lesions. Crossen emphasizes that the time to cure cancer is before it starts and that carcinoma of the cervix follows long-continued irritation in the form of chronic cervicitis, which is usually accompanied by ulceration, infiltration and cystic change. During the last three years in the public wards of the Toronto General Hospital there has been no case in a nulliparous patient, and in private practice I have only seen one case in a patient who had not had a baby, and that patient had previously had an early abortion. In the past, too many patients have either had no post-partum examination of the cervix, or have been told that the cure of any cervical lesion should be left until after the childbearing age. By the use of a simple electric cautery in the office the operation for cervicitis is seldom required. When operation is necessary it is usually in patients with lesions of long standing. The importance of cervical prophylaxis cannot be over-emphasized.

The greatest factor in the prognosis of cervical cancer is the stage at which treatment is first started. The reports from all large cancer clinics are unanimous in stating that lamentably few are seen in the early stages. Out of 79 new cases seen in public ward practice in the last two years only 34 came in the operable or "borderline" groups. In private practice cases are beginning to come somewhat earlier, and it is also encouraging that a considerable number of women over the age of forty are presenting themselves for examination with the idea of forestalling the development of this lesion. This, I believe, is an evidence of what may be accom-

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plished by a campaign of sane, conservative education of the public. The responsibility for delay in seeking treatment is about equally divided between the nature of the disease, the patient herself and the medical profession. The nature of the disease is insidious and in not a few instances may be well advanced before there are any symptoms at all. A typical example is cancer starting just at the external os and invading the substance of the cervix beneath the cervical mucosa. In such a situation it may progress to a considerable extent before there is ulceration and, therefore, before there are symptoms, and when it does eventually break through the vaginal mucosa a large excavating ulcer is immediately present and extensive involvement of the deeper structures may be found. The earliest symptom is usually only a slight irregular bleeding, and it is here that the responsibility of the patient and her doctor arises. The fact that irregular bleeding occurs so frequently after the age of forty has resulted in the belief among women that it is almost to be expected, and so they do not seek advice at the onset of this symptom. When they do present themselves for examination, too frequently they are treated medically without any examination, or at best, a very casual one. It cannot be emphasized too vigorously that any excessive or irregular bleeding is not physiological and that any woman suffering from irregular bleeding, however slight, is entitled to a diagnosis. It is my experience that an increasingly large number of patients are seeking advice for slight irregular bleeding. Thus correspondingly greater responsibility is being laid upon the general practitioner. If cancer of the cervix is easily diagnosed in the gross it is usually well advanced. The early diagnosis is microscopic and a biopsy should always be done in any case of bleeding where the case is not obvious. With a sharp scalpel a piece may be excised from the cervix in the consulting room with little discomfort to the patient. If the bleeding is coming from the supra-vaginal portion of the cervix, an anæsthetic and curettage is necessary and should not be neglected.

Although early diagnosis is of vital importance I do not believe the public should be taught that all cancer of the cervix can be cured if diagnosed early enough. Some lesions of very small local extent have already progressed beyond the scope of any known therapy, for both radium and surgery are only local in their application and the eventual hope of a cure for cancer lies in some form of systemic attack at the disease.

There is no controversy regarding the treatment of inoperable cases. Radiotherapy offers the only hope and only a small proportion of these will result in five-year cures, but a great deal can be done in a way of palliation. The term "five-year cures" should not be misunderstood. It is only a measure of the success of any form of treatment, and because the patient is still alive without signs of disease at the end of that time does not mean that she may not subsequently die of cancer, for a proportion of such cases show further evidence of the disease after seven, ten or even fifteen years. It is, however, the most satisfactory method we have to-day of evaluating our results.

What constitutes an operable case depends, to some extent, upon the operator, and, as a rule, the surgeon who has a high percentage of operability will have a correspondingly small percentage of five-year cures. On the other hand the surgeon who operates upon only a small proportion of the total number of cases seen will be choosing the earliest ones, as well as the best surgical risks, and will have a greater percentage of five-year cures. There is still a difference of opinion regarding the treatment of operable cases, though opinion is swinging more to the use of radium. The results of surgical treatment in the hands of those who are most skilled only equals the results of skilled radium treatment. Victor Bonney (*Lancet*, 1930, **1**: 277), reports 38.7 per cent of 284 patients alive and well at the end of five years following extensive operation. The five-year cures of Regaud and of Heyman are about the same, taking all cases into consideration, though Regaud's are somewhat better in the operable group. Heyman collected reports of 5,024 cases which were operated on with 18 per cent of five-year cures. In this number 3,659 cases were in groups one and two, and they showed 36.5 per cent of five-year cures. He then collected reports of 3,512 cases treated with radium, with 16.3 per cent five-year cures, and in the early cases 34.9 per cent of cures. The primary mortality was 2 per cent in the radium group, and 17 per cent in the surgical group. The mortality from the radical operation is high, even in the hands of those who have had extensive experience. Bonney's primary

mortality was 20 per cent in his first hundred cases, but has decreased to 8 per cent in the last group. It is true the mortality can be kept low by doing a less radical operation, such as the ordinary panhysterectomy, but nearly all are agreed that this course is not justifiable, for the final cures are so very few. In a recent report by Lynch there were 26 cases in which panhysterectomy was performed by competent surgeons with no cure over more than four years, in spite of post-operative radiation. Surgery must consist of the radical operation or none at all. In his report of a five to fifteen year follow-up of 192 cervical cancers Lynch says "Whatever the future will determine as to the relative values of truly radical surgery and of radium, there is no doubt whatever that the results of radium, even in inoperable cases, far surpass those of ordinary panhysterectomy, even in cases deemed at least sufficiently operable to warrant this employment. The time has now arrived when the case has been proved that the ordinary panhysterectomy has no place whatever in the treatment of any but microscopic and, therefore, unrecognized cancer."

As few skilled surgeons have had the opportunity of great experience in this operation, few can show results comparable to Bonney's. It is also true that the average results of radium treatment are not as good as those published by Heyman, Regaud or Healy, but it is significant that there are a larger number of radium centres publishing results that approximate the best than there are of surgeons doing the same. The great difficulty in comparing statistics is not knowing the extent of the disease in a given case. This is particularly true with radium where the tissue is not removed and examined. It is our belief that all cases of cancer of the cervix should have radiotherapy and not operation.

I believe the proper place for the radiological treatment of cancer is in a properly equipped cancer clinic. Such an institution may be a separate entity or a distinct department of a general hospital. In either event it should be completely equipped, not only with radium but also with adequate x-ray machines for deep therapy, laboratories, both pathological and physical, and should be manned by a specially trained staff. Radium is as potent for harm as it is for good. Reasonable familiarity with its properties will prevent gross damage being done, yet considerable experience is required if the patient is to receive the maximum benefit from treatment. No matter how well trained a surgeon may be his skill is increased with added experience and the same undoubtedly is true as regards radium. We find in the literature that the results of treatment in all large institutes have improved with increasing experience. Moreover, the cancer patient should have the benefit of the consideration and experience of a group rather than of a single individual who sees only a few cases of any given type of cancer in a year. The therapeutic use of radium should be combined with cancer research, and this can only be done in a properly equipped institution. Such research should be not only clinical but also pathological, physical and experimental. Lastly, the proper evaluation of the results of treatment is only possible in a clinic and even there there is difficulty. This is especially true in a country like ours with a relatively small population scattered over a large area. For the last two and one-half years we have had a follow-up clinic for all cases of cancer coming to the gynæcological service of the Toronto General Hospital, and recently we wrote to their physicians regarding 29 from whom we had not heard during the past six months. We have failed to get answers regarding 18 of these.

The prognosis in a given case of cancer very frequently depends upon the skill and judgment of the physician first consulted, but it is also true that the responsibility of one who undertakes treatment of such a case does not end until the death of the patient. To apply radium, dismiss the patient, and know nothing of the final result is not only unscientific but is unfair to the public and to the good name of radium. In order to achieve a proper follow-up there must be a close cooperation between the general practitioner and the cancer clinic.

The methods of applying radiological therapy to cancer of the cervix are not uniform, but mostly they fall into two groups; the use of a small amount of radium for prolonged periods, and the use of a larger amount for short periods of time. We usually favour the former and use heavily screened element for five or six days, but in cases where there is a large fungating growth, or where the cervical canal cannot readily be found, we often use 80 to 100 mgrm. for twenty-four to thirty-six hours, and later on follow with a second treatment. In the last two

years we have gradually tended to increase the total dosage until now we give 8,000 to 10,000 m.g.hr., with about two-thirds of the dosage applied in the vagina. We feel that thorough cross-firing is essential and try to reach the parametrium to as great an extent as possible. When radium is applied in the uterus or vagina its ability to successfully destroy cancer cells probably does not extend beyond two to three centimetres from the walls of the applicators. It is because of this fact that we are coming to the opinion that every case of cancer of the cervix should have deep x-ray therapy in addition to radium. In the attempt to reach the outlying cellular tissue we have tried the intra-abdominal implantation of radium in eight cases and in spite of unfavourable reports from other centres are not convinced that this method is without value in properly selected cases. All eight of our patients had well marked parametrial involvement and four of them are alive for periods of one and a half to four years, and are doing so well that we are watching them with great interest. The interstitial use of needles in the local growth has not appeared satisfactory and we now reserve it principally for recurrences. We also feel that each succeeding failure to radiate cancer successfully renders the next attempt more difficult, because of increased tissue resistance.

Finally, just what can radium offer to the various classes of cervical cancer?

First to the patient with the class one or class two lesion, so-called "operable cases." With proper facilities for treatment, from 35 to 40 per cent of these patients should be alive and free from recurrences at the end of five years, which is about all that the greatest surgical skill can offer. This result will be attained with practically no operative mortality and a minimum of suffering. Freedom from evidence of cancer at the end of five years is the best practical measure of the efficacy of treatment, but a considerable proportion of these patients will eventually die of cancer. In Lynch's series there were eight cases of groups three and four who were five-year cures, yet two of them developed recurrences of the vaginal cancer, one six and a half, and the other seven and a half years after radiation. Moreover, two other cases developed breast cancer of which they died five and a half and ten and a quarter years after apparent cure of the pelvic cancer.

Secondly, "inoperable cases" — groups three and four. In only a small percentage of these cases, from 5 to 10, can we hope for a five-year cure, but even such salvage is a great deal, for they would inevitably perish were radium not available. In those where a five-year cure is not obtained much may be achieved. Life is definitely prolonged in a large proportion and the distressing local symptoms of bleeding and foul smelling discharges are removed. In many a local cure is achieved and the patient succumbs to distant metastases. Some of these cases, however, fail to respond to radium at all, and they are the ones opponents of radium therapy are inclined to cite, forgetting that the same case had no other hope at all.

Some centres refuse treatment to those who have been radiated elsewhere, but if we can obtain accurate knowledge of the dosage and screening employed we treat such patients. The hope of a five years' cure is not very great in our experience, though Gray Ward has recently stated that 26.5 per cent of his cases that were re-radiated lived five years or more. If the recurrence is local we again treat with radium, usually in the form of heavily screened needles, but if the recurrence is deep in the pelvis deep x-ray is used, either alone or in conjunction with radium needles. Finally, if we take the whole group of cervical cancers as they appear at a clinical centre, radio-therapy will offer a five-year cure to about 20 per cent of them, and palliation to a much larger proportion of the rest.

In dealing with a disease as tragic as cancer we should remember that hope should never be taken from the mind of the patient, on either humanitarian or practical grounds. It would be well to remember the aphorism of Rhazes, the great Arabian physician of the 10th century, who said "Physicians ought to console their patient even if the signs of impending death seem to be present."

ELECTROCARDIOGRAPHIC CHANGES IN PULMONARY TUBERCULOSIS

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PULMONARY tuberculosis is usually an easily observable chronic infection, and possibly electrocardiography in this disease may help to discover the possible effect upon the heart of chronic infections in general. Electrocardiographic tracings have been made in 304 unselected cases of pulmonary tuberculosis of all sorts at the Mountain Sanatorium in Hamilton. The Table shows the diagnoses made and their relative frequency.

ELECTROCARDIOGRAPHIC DIAGNOSES IN 304 UNSELECTED CASES OF PULMONARY TUBERCULOSIS

Normal electrocardiogram (including cases with T3 alone negative)	236	
Levogram	49	(16.1%)
Dextrogram	24	(7.9%)
Marked sinus arrhythmia	1	
Extra-systoles (auricular, ventricular and nodal)	7	
Auricular fibrillation (of arteriosclerotic etiology)	1	
Paroxysmal tachycardia (rheumatic history)	1	
Low voltage (8 mm. or below in all leads)	12	
P-R interval prolonged	3	
Sino-auricular block	1	
Bundle-branch disease	5	
Complete heart block (of arteriosclerotic etiology)	1	
Negative T waves (except T3 alone)	8	
T waves of "coronary" type	3	

Dextrograms.—The incidence of these curves in the present series is higher than one would expect in a series of normals. This observation has been made by others.[1, 2, 3, 4] The curves may be explained by an actual predominance of the mass of the right ventricle over the left,[5] or by an altered position of the heart,[6] particularly by the vertical or "drop" heart,[4] which is more common among the tuberculous than in normal persons.[7] None of our cases showed clinical evidence of mitral stenosis.

Important changes in the tracings.—A considerable number of tracings usually interpreted as indicating myocardial damage occurred in the series and are noted in the Table. These include cases of low voltage, various grades of heart block, negative and "coronary" types of T wave. In all these cases the clinical duration of the tuberculosis was more than a year at the time the tracing was taken. In 6 cases a heart lesion of known etiology was associated with the pulmonary disease. Of 6 cases with negative T waves, other than T3 alone, and uncomplicated by heart disease of known etiology, 4 are now dead, 1 is still in the sanatorium, and the condition of the others is unknown. Similar findings in cases of tuberculosis with negative T waves have been previously reported.[1]

Two cases showed recovery of low voltage (Below 8 mm. in all leads) to normal as their tuberculosis improved. One developed low voltage as his tuberculosis progressed. In one case a negative T1 became positive when the pulmonary disease became arrested. This patient also had rheumatic heart disease with an aortic valve lesion.

Two patients without history of coronary artery disease showed T waves suggestive of the Pardee type. Both of these were found after left phrenectomy. A tracing in one of them had been taken before left phrenectomy and found normal. In the other case a second tracing was taken several months after phrenectomy and was found normal. Slight deviations of the S T interval, being of doubtful significance, are not reported upon, but occurred not infrequently.

CONCLUSIONS

1. Important electrocardiographic changes are found not uncommonly in cases of *chronic* pulmonary tuberculosis of more than a year's duration, and in the absence of other likely causes for the heart lesion.

2. In such cases dextrograms are more common than among normal people.

3. An electrocardiogram should be taken when considering thoracoplasty, in order to help estimate the prognosis.

4. In two cases variations in the T waves appeared to be related to left phrenectomy.

5. Cases with negative T waves, other than T3 alone, usually do badly so far as their tuberculosis is concerned.

6. Electrocardiographic changes paralleling changes in the pulmonary disease were occasionally noted, though not specially sought for.

NOTE: The author thanks Dr. John Oille, of Toronto, very heartily for his help in the interpretation of nearly all the abnormal tracings.

The work was done at the Mountain Sanatorium, Hamilton, Ont.

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CONGENITAL HERNIA OF THE OVARY AND TUBE INTO THE CANAL OF NUCK WITH REPORT OF A CASE

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HERNIA of the ovary and Fallopian tube into the canal of Nuck is mentioned for the first time in the writings of Soranus of Ephesus (97 A.D.), Andrews[1] collected 88 cases in 1906 and Carstens[2] added 27 to these a year later. Müller[3] described an interesting case of bilateral ovariocele in 1918 on which he operated when the infant was five months old. In 1923 Watson[4] collected 175 cases from the literature. These included 12 femoral and 13 of other varieties of hernia involving the ovary and tube. He also found 134 cases of inguinal hernia of the ovary alone and 41 of the tube alone, making a total of 325 inguinal hernias in which the ovary or tube or both were the contents. Wakeley[5] reported 25 cases of hernia of the ovary and tube in 1930. These were operated upon between the years 1919-1929 at King's College Hospital and Belgrave Hospital for Children. During the same period 500 cases of hernia in females were operated upon in these two hospitals. When one recalls that congenital hernia occurs in the ratio of 40:1 in males compared with females, the relative rarity of this type of hernia will be obvious. In Wakeley's 25 cases only 3 were under the first year. In a review of the literature it is unusual to find one man reporting more than one or two cases of his own experience, with the notable exception of Nicoll,[6] who in 1906 published 12 of his own cases, 8 of which were in infants.

The developmental defect causing hernia of the ovary into the canal of Nuck is of special interest in the fact that it simulates the normal descent of the testes in the male. The gubernaculum of the ovary, which is the anlage of the ovarian and round ligaments, becomes attached to the cornu of the uterus. This prevents the descent of the ovary into the inguinal canal in normal development, even though the distal end of the gubernaculum is attached to the labium majus, the homologue of the scrotum. It is possible that when this mechanism is defective the gubernaculum may pull the ovary down into the canal of Nuck and in some cases into the labium majus. The defect may be that a few muscular strands of the gubernaculum do not become attached to the uterus. Instances of a combined gland or ovo-testis have occasionally been found in this type of hernia. The canal of Nuck, which is analogous to the processus vaginalis in the male, is normally obliterated at the end of the eighth month of fetal life, but may remain patent throughout adult life.

In considering the causes of hernia into the canal of Nuck of infants one must not overlook factors other than congenital defects, or, as some call it, a predisposition. Chief among these is increased intra-abdominal pressure due to constipation, tight abdominal binders, excessive crying or persistent coughing. There is also an hereditary tendency. The uterus and adnexa are located in the false pelvis at birth and until further enlargement of the true pelvis after the first year of life. In cases of a patent canal of Nuck, if the ovarian and the infundibulopelvic ligaments are lax, a hernia may occur involving these structures as well as any others in the false pelvis. In adult females the most common causes are numerous pregnancies, obesity, heavy lifting, and any factor which weakens the abdominal wall or results in increased intra-abdominal pressure.

The symptoms vary with the age of the patient. In the young there are pain and tender-

ness exhibited by crying and flexion of the thigh on the same side where one finds the swelling in the inguinal canal. In adults the chief complaint is pain and tenderness during menstruation, when there is swelling of the ovary, and there may be tenderness between periods. Palpation will reveal the presence of the ovary in all cases.

The treatment of choice in all cases is operative. In children the usual advice given in the texts is to wait until from the second to the fifth year. In the interval the only alternative offered is a truss. The reasons given for postponement, as summarized by Campbell and Kerr,[7] are as follows: (1) thinness of the sac; (2) diminutive anatomical structures; (3) sensitiveness to shock; (4) a low nutritional index. The reasons for operation are: (1) the chances of cure diminish with age; (2) truss pressure causes atrophy of the underlying muscles; (3) a truss interferes with proper exercise; (4) cures by truss are often, and some say always, only apparent, not permanent; (5) the younger the child the better the result; (6) a truss is dirty and not without dangers *per se*; (7) the ward class of patient cannot afford the constant care that is essential for the intelligent use of a truss. It is sufficient to say that practically all cases finally terminate in operation. This being the case, there are very few infants that should not receive operative treatment as soon as the condition is recognized. In the experience of the writer infants withstand operative shock as well as, and in some instances better than, older children. The shock following an herniotomy is minimal in most cases, provided there is no complication, but, to wait until strangulation or torsion occurs makes the operative risk maximal.

CASE REPORT

M.J.M. was born at home on December 9, 1932. Delivery was normal. Weight at birth was 6¼ pounds. After dessication of the cord, the umbilicus was seen to be markedly protuberant and a tight abdominal binder was applied. No other congenital defects were noted at the time.

Family history.—The father has had a reducible oblique inguinal hernia for several years. The mother and five siblings are negative.

Complaints.—The mother noticed a swelling over the left inguinal region on January 20, 1933, and associated it with crying spells and restlessness on the part of the infant. The thigh on the same side was seen to be flexed for long periods. The child was weaned from the breast on February 9th. The infant was admitted to the Hôtel-Dieu Hospital, Kingston, on February 23, 1933. Examination revealed on palpation a freely movable tumour in the inguinal canal, the size of a Lima bean. The hernia was easily reduced, but recurred within a short time. Because of a low nutritional index, the patient was put on high protein feedings.

Operation.—March 2, 1933. (Age eleven weeks; weight 9½ pounds). Chloroform anæsthesia. A high incision was made over the upper half of the inguinal canal and the sac exposed without difficulty. On opening it a small quantity of blood-stained fluid escaped. Previous to this time there was no indication of torsion or strangulaton. The contents were the ovary, Fallopian tube, infundibulo-pelvic ligament, and a short loop of the sigmoid colon. The ovary appeared congested but was not otherwise damaged. Replacement of the contents did not require division of the infundibulo-pelvic ligament. The neck of the sac was ligated and the excess removed. The internal oblique muscle was brought down to Poupart's ligament with two sutures. The external oblique was not imbricated but sutured with continuous chromic. Silk-worm skin sutures were used. The wound was dressed with bismuth paste.

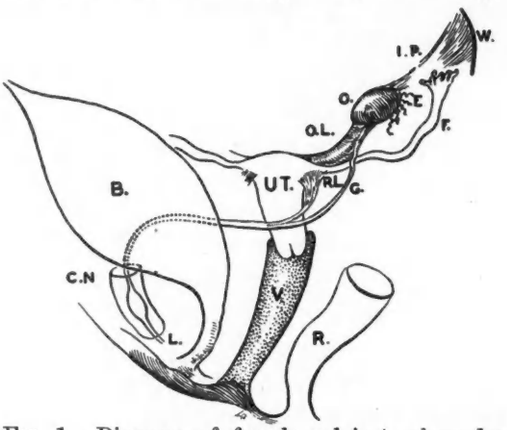

FIG. 1.—Diagram of female pelvis to show descent of the ovary into the canal of Nuck. (After Allen Thomson).

O.–ovary.
G.–gubernaculum of ovary.
O.L.–ovarian ligament.
R.L.–round ligament.
C.N.–canal of Nuck.
F.–Fallopian tube.
E.–epoöphoron.
I.P.–infundibulo-pelvic ligament.
B.–bladder.
V.—vagina.
R.–rectum.
Ut.–uterus.
W.–lateral wall of pelvis.
L.–labium majus.

Post-operative course. — The patient suffered no nausea, restlessness nor the slightest shock. In four hours she took water and in ten hours a one-ounce milk feeding. Careful nursing, on which the success of the operation depends, and daily dressing with bismuth paste prevented soiling and infection of the wound. The skin sutures were removed on the fifth day. The patient was discharged on the twelfth post-operative day.

CONCLUSION

Despite Russell's dictum of complete cure by ligating the neck of the sac, it was considered better to reinforce the abdominal inguinal ring by means of the internal oblique.

It is the opinion of the writer that all hernias in infants should receive operative treatment as soon as possible after weaning. Once completed, the dangers of pressure on the gland with resultant atrophy, cystic and malignant changes, torsion of the pedicle and strangulation of the contents are forever prevented. As in the aged,

surgery in infants requires careful weighing of all the factors in each individual case.

SUMMARY

1. Congenital hernia of the ovary and tube into the canal of Nuck are relatively rare.

2. Reports of operations on this type of hernia before the completion of the first year are still more scarce.

3. A case operated upon at the eleventh week is presented. The ovary and tube were accompanied by the infundibulo-pelvic ligament and sigmoid colon.

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Case Reports

A CASE OF RELAPSING DESQUAMATIVE SCARLATINIFORM ERYTHEMA COINCIDENT WITH THE PUERPERIUM

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Mrs. S., aged 38, para-5, pregnant, entered hospital at 6.30 p.m. on April 4, 1932. Delivery took place at 7.15 p.m., and the secundines were expressed complete at 7.35 p.m. No examination had been made; there was no hæmorrhage, and no laceration. On the afternoon of the next day she had chills and a temperature of 100° F.

On April 6th, in the morning, the patient was completely covered with a vivid scarlet rash; temperature 101° F.; pulse 100. She was isolated.

April 7th: a.m., temperature 103.6° F.; pulse 110. Desquamation was occurring; the bed and floor of the ward were covered with large plaques of epidermis, many the size of a sheet of note paper. Intractable diarrhœa and vomiting were present. Movements were involuntary. Depression was profound. The face was covered with brownish crusts and presented a hideous appearance. The patient was apparently *in extremis*. The desquamation involved all the visible mucous membranes. She remained very ill until April 10th when improvement began and recovery became complete.

April 14th: temperature and pulse normal.

Diagnosis.—Puerperal sepsis with rash; scarlet fever, erysipelas, erythema scarlatiniforme, dermatitis exfoliativa.

April 15th: temperature 100° F.; pulse 100; rash, desquamation, diarrhœa, vomiting; all the manifestations of the previous 10 days were repeated with less severity. She became normal again by April 20th.

April 21st: all features were again repeated, but still milder; she became normal again on April 26th.

April 27th: the same history was repeated, but still milder, becoming again normal on April 30th, when she left the hospital for a friend's house next door.

May 4th: another mild relapse. She returned to her home on May 6th. During the first week at home all the finger nails exfoliated; during the second week at home all the toenails were shed, with partial loss of hair, eyebrows, and eyelashes. Final result: the nails and hair were restored, and the patient was in good health.

Final diagnosis: relapsing desquamative scarlatiniforme erythema (Allbutt), or erythema scarlatiniforme recidivans (Pusey).

SUMMARY

1. A very rare skin disease coincident with the puerperium. To my knowledge it is not mentioned in any work on obstetrics.

2. Five relapses, each repeating immediately the symptoms of the previous one, though milder in degree, were observed.

3. Rash and desquamation were almost simultaneous.

4. Exfoliation of the epithelium in enormous plaques, affecting the visible mucous membranes, probably also the intestinal mucosa, the nails and hair.

5. Complete recovery with restoration of the skin appendages in ten weeks. The hair, previously straight, now has become very curly.

6. The affection was neither contagious nor epidemic.

7. The bacteriology was not investigated. Exogenous infection was improbable, a possibility reduced to the minimum. No foci of infection were demonstrated.

A CASE OF OBSTRUCTED LABOUR DUE TO NON-PREGNANT HORN OF A UTERUS DUPLEX*

BY J. L. HALL, M.B.,

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Mrs. M.E., aged 22 years, born in Canada, para 0, gravida 1, was admitted to St. Joseph's Hospital, December 20, 1932.

Her last menses began on April 15, 1932, and confinement was expected on January 25, 1933. Her general history was negative, recording no serious illness, operations, nor menstrual disorders.

Her blood pressure and urine had been found normal during the past three months by her family physician. Her external pelvic measurements were ample, but she was not examined bimanually until after the onset of labour. At time of admission she had been in labour 50 hours and was complaining of almost continuous pain, particularly in the back. Temperature 101° F., pulse 124, respirations 26.

General physical examination showed a well developed adult female who was fatigued and partly under the influence of morphine and nembutal which had been administered to her previous to admission. Heart and lungs were normal.

Abdominal examination showed the uterus to be enlarged to the size of an eight months' pregnancy, tender on palpation and more prominent in the abdomen than usual. The uterus felt very hard, as if it were in tonic contraction and fetal parts could not be outlined. The fetal heart could not be heard at this time. On account of extreme hyperæsthesia of the patient vaginal examination was done under light anæsthesia. There was considerable amount of creamy purulent discharge from the vagina; otherwise the introitus and vagina were normal.

A large smooth round mass could be felt in the posterior *cul-de-sac,* which so filled the pelvis that the cervix, which was about four fingers dilated, was found to point directly anterior at just below the level of the umbilicus. It was impossible to move the mass impacted in the pelvis, so that a Cæsarean section was decided upon.

The uterus was found to be a uterus duplex bicornis with the non-pregnant right horn impacted in the pelvis and the pregnant left horn rotated anteriorly and upward so that the cervix pointed anteriorly. A living female child of four pounds fourteen ounces was delivered and a complete hysterectomy done, both tubes and ovaries being left behind. This was felt to be advisable because of evidences of infection, as shown by a temperature of 101° F. and pulse of 124, together with the purulent vaginal discharge.

Both mother and baby have done well. The mother had slight wound infection, but was discharged from the hospital on the fourteenth day after operation, and when examined one month later was in excellent health.

The specimen was a uterus duplex bicornis, there being two complete uterine cavities and two cervices with a normal single vagina. The non-pregnant horn was about the size of three-months' pregnancy.

This abnormality is found in well developed adult females, and, together with bicornuate uterus, constitutes the most frequent form of uterine anomalies. The most extreme double anomaly is uterus didelphys, in which there is no union of uterine bodies and a double vagina.

In a review of fifteen cases of pregnancy in milder types of bicornuate uterus, F. H. Falls[1] estimates the frequency of these deformities at 1 per cent, and says that prolonged gestation, long labour with weak pains, and operative deliveries are common. D. Dougal,[2] in 1926, reported a case of labour obstructed by the non-gravid horn of a double uterus in a woman 33 years of age, two days after the onset of labour pains, which were weak and infrequent. Cæsarean section was done, and a living child obtained. Pregnancy had occurred in the right horn of a uterus bicornis unicollis, and the left horn, the size of a three-months' pregnancy, lay at the level of the pelvic brim.

There are other cases in the literature of pregnancies in various forms of double uteri but few in which obstructed labour has occurred.

* Read before the Section of Obstetrics and Gynæcology, Academy of Medicine, Toronto, March 23, 1933.

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LUETIC SPLENOMEGALY*

BY HERBERT V. DOBSON, B.A., M.B., M.S.,

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In the light of present-day medical knowledge it is a truism that syphilis frequently is extremely insidious in its development from primary infection to the time of appearance of major symptoms, and that it may be very widespread and bizarre in its manifestations. However, repetition of such a statement is valuable if it draw further attention to the need of considering the possibility of luetic infection as the underlying cause in a wide variety of conditions. The following rather exceptional case is illustrative.

Mrs. X., a housewife, white, aged 48, was first seen on November 9, 1931, when she complained of weakness and an abdominal swelling. Nothing elicited in the family history seemed to have relevant bearing on the patient's complaints. She was first married at 22, her husband dying 10 years later of pneumonia. During these 10 years she had given birth to 5 children who are living and well, 2 children who died in infancy, and she had had 5 miscarriages. She had been married a second time for seven years, her husband being alive and well at the time of her examination. During this period she had 7 miscarriages and gave birth to no living children. Her menstrual history was unimportant, except that relating to the climacteric about a year previously. Apart from smallpox in 1925 and three attacks of influenza she had suffered no acute illness.

She stated that, with the exceptions mentioned, she had been healthy and active all her life until about 18 months previous to her examination, when she began to have menorrhagia —an excessive flow lasting for 2 weeks. Menses then occurred every 2 months and she was confined to bed usually for 2 days with excessive loss until a year previous to examination, when there was gradual cessation of the flow. Three months after the onset of symptoms (August, 1930) she began to exhibit weakness, fatigue and pallor. Four months later she had tachycardia, anorexia, nausea and heartburn. About April, 1931, she first noticed a mass in the left side of the abdomen and this had steadily enlarged, showing most rapid progression in the last two months. In June, 1931, she had received a blood transfusion without any subjective change in her condition. During the spring and summer she had taken much liver extract, which helped her somewhat. Although not completely incapacitated, her activities had been greatly curtailed, weakness and increasing pallor having rendered it difficult for her to keep from becoming bedridden.

By systems, the history, except as stated, was essentially negative, although she thought that at one time she had a few "purple spots" on the chest. There had been no glossitis, epistaxis, or other abnormal bleeding, other than the menorrhagia.

The patient, who was 64¾ inches in height and weighed 140 pounds, presented normal development and nutrition. There was marked pallor of the skin and buccal mucosa and a subicteric tint to the skin and conjunctivæ. The heart was of normal size, but the sounds were rather distant and a systolic murmur was heard over the whole precordium. Blood pressure determinations were: systolic 108, diastolic 140, and the heart rate was 86. The lungs were clear to auscultation. Abdominal examination disclosed a very large, smooth, hard mass extending from the left flank medially, somewhat to the right of the mid-line, and vertically from the level of the seventh chondrosternal junction to an inch below the crest of the ilium. The median edge was rather sharp and notched. The mass moved during respiration. The uterus was of normal size and retroverted, but contained no palpable nodules. A perineal scar and an external hæmorrhoid were observed. The nervous system was normal to quick tests.

Data from laboratory examinations were as follows: Urine (voided specimen), specific gravity 1.020; reaction alkaline; albumin, negative; sugar, negative; microscopically, an occasional white blood cell. Blood count, hæmoglobin, 35 per cent (Tallquist); red blood cells, 1,587,500; white blood cells, 7,400; neutrophiles, 78 per cent; lymphocytes, 14 per cent; large mononuclears, 6 per cent; eosinophiles, 2 per cent. The red blood cells showed some variation in size and staining. A few poikilocytes, but no nucleated cells, were present. Van den Bergh reaction, indirect. Serum bilirubin, 3.2 mgrm. per 100 c.c. Clot retraction, normal. Serum Wassermann reaction, very strongly positive (3 plus). Kahn precipitation test, negative.

* From the Standard Medical and Surgical Clinic.

For ten days before the report of the Wassermann test was made the patient received large doses of liver extract and iron and minute amounts of copper. An improvement in the condition of the blood was observed—hæmoglobin, 35 per cent (Tallquist); red blood cells, 2,162,500; reticulated cells, 22.5 per cent—but only slight amelioration of symptoms. This treatment was continued.

Antiluetic treatment was commenced on November 18, 1931. This consisted primarily of daily intramuscular injections of mercury succinimide and potassium iodide by mouth. There was prompt clinical improvement, objectively and subjectively, and in 14 days the spleen was one-third smaller, while the blood condition showed hæmoglobin, 65 per cent (Tallquist), and the red blood cells 2,700,000.

A course of twelve intravenous injections of neosalvarsan administered thereafter at intervals of four to eight days (usually four or five) produced marked improvement, the spleen being two-thirds smaller and the anæmia greatly reduced on completing this phase of the treatment (hæmoglobin, 60 per cent by the Dare method—normal 70 to 80 per cent; red blood cells, 4,000,000). The use of thirty-six daily inunctions of mercury during February and March was accompanied by further recession in the magnitude of the spleen to one-eighth or one-tenth of its original size. The patient felt quite well and weighed 157 pounds. During March and April she received twelve intramuscular injections of a bismuth preparation, and during May and part of June a second course of twelve intravenous injections of neosalvarsan at intervals of four or five days. At this time the serum Wassermann reaction was negative, hæmoglobin, 70 per cent (Dare method), and the spleen was about one-fifteenth of its maximal size, being readily palpable at the left costal margin. The patient was ordered to take a second course of mercury inunctions and then have a rest period of two or three months. When seen on November 8, 1932, for a minor complaint she reported that she had been quite well. The serum Wassermann reaction was negative.

SUMMARY

The significant features in the history and management of this case are (1) the numerous miscarriages and infant deaths; (2) the massive splenomegaly; (3) the positive serum Wassermann reaction and negative Kahn precipitation test (this was repeated with the same result); (4) the marked anæmia; (5) the insufficiency of treatment of the anæmia in the absence of antiluetic treatment, in spite of marked activity of the bone marrow (reticulated cells, 22.5 per cent); (6) the prompt subjective and objective response to antiluetic treatment; (7) the sustained favourable effect to date of antiluetic treatment without recourse to splenectomy; (8) the intensity of antiluetic treatment, with the avoidance of primary use of arsenic medicinals, and subsequently the short intervals at which doses of neosalvarsan were given (4 to 5 days); (9) reversal of the serum Wassermann reaction.

TRAUMATIC RUPTURE OF THE JEJUNUM

BY J. C. DIAMOND,

Fort William

On March 20, 1932, W.S., male, aged 7, while playing tee-tor-totter (a kind of see-saw) with other boys was hit in the pit of the stomach with the tee-tor-totter. He went home about 7 blocks' distance and complained to his mother of a severe pain in his abdomen, vomited once, but had no blood in the vomitus. When I saw him three hours later, 2 p.m., he was lying in bed with his legs drawn up and writhing in pain. He had an anxious look on his face and seemed to suffer a great deal. The temperature was 98° by mouth, pulse 62, respirations 20 per minute. The abdomen was very tender and of a board-like rigidity. The urine was negative; leucocytes 20,000. A diagnosis of traumatic intestinal rupture was made, and at 3.15 p.m., under ether anæsthesia, an upper right rectus incision was made. No free gas was found but a few bile-stained strands of undigested material was the guide to the place of injury. A wound of about 2 inches in length in the longitudinal direction of the jejunum was found. I sutured it in a direction transverse to that of the wound so that no narrowing of the lumen of the bowel would result. The appendix was chronically diseased so I removed it. There being no free intestinal contents in the abdomen to speak of, the abdomen was closed in layers without drainage.

The condition of the patient after operation was good. He seemed to have suffered very little shock at any time. His temperature ran

between 98° and 102°, pulse between 98 and 112, respirations between 20 and 24. He voided regularly and enemas gave good results. There was no distension and no rigidity and very few complaints of pain. On the ninth day after operation, however, he vomited and complained of a pain in the stomach.

I then removed the sutures and found that the skin was completely united but the sutures felt as if coming out of doughy material. A little swabbing of the scar with mercurochrome opened the wound completely and revealed the fact that the deep tissues had made no attempt at healing. The whole thickness of the abdominal wall except the skin was very œdematous. I strapped the wound together with adhesive plaster and a dressing and left him, at the same time watching him very closely. Enemas were effectual but vomiting was getting worse gradually and his general condition was also not satisfactory. On the twelfth day after operation he became very restless and vomiting became fæcal. His temperature was 98½°, pulse weak and rapid, respirations 28. He complained of a great deal of pain and was quite distended. A loop of small bowel protruded from the lower end of the wound.

I felt that immediate surgical action was required and under light ether anæsthesia, with my index finger in the wound I circled around under the peritoneum. I encountered a small knuckle of small bowel completely surrounded by a band of adhesions at the upper part of the wound, which apparently was the cause of the obstruction. The wound was closed with through and through silk worm catgut and a few interrupted skin sutures. The whole operation only took about ten minutes. Interstitial glucose saline was given immediately after operation. The patient's condition gradually improved and the wound healed with very little further trouble. The patient was discharged on April 28, 1932, with the wound healed and feeling perfectly well.

COMMENT

Severe internal injury was present and yet the skin did not show any bruising, although the abdominal wall was apparently quite bruised from the injury. The boy showed no shock, but the history of injury and physical findings and his slow pulse was against internal hæmorrhage from liver or spleen. I do not know how the complication that followed could have been avoided, as apparently the contusion of the abdominal wall caused a piece of bowel to become adherent, and gradually a band of adhesions tightened around it, producing the obstruction. The release of the obstruction was all that was required to overcome the complication.

Clinical and Laboratory Notes

A SIMPLIFIED INSULIN TECHNIQUE*

BY D. G. REVELL, B.A., M.B.,
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Insulin has so changed the prognosis of diabetes that now even fairly severe cases may look forward to the possibility of many years of a fairly healthy, active, useful and happy life. Anything that facilitates the use of insulin by the diabetic will lessen the tedium of the burden which his disease lays upon him day by day, day in and day out, for the rest of his days. It also will make for that regularity of insulin-administration which is so essential to its full usefulness to the individual patient. There must be no let-up to this regularity. The technique here described was developed in treating two cases during the last eight years, and was devised to overcome certain objections which were met with in the usual technique as given in the circular sent with insulin by the manufacturer.

The outfit and procedure are as follows.—

1. Insulin of strength suitable for the requisite dosage. The strengths available are single or 10 units per c.c., 20, 40 and 80 units per c.c. The last is now regularly supplied, but for a time it was prepared only on request. The first concentrated insulin used in the two cases mentioned was stated to be of 89-unit strength and was part of an experimental supply given to Dr. J. B. Collip by the Eli Lilly Pharmaceutical Company of Indianapolis, Ind., the first commercial firm to manufacture insulin on a large scale. I also had the very helpful advice of Dr. Collip during the early use of this concentrated insulin.

I would advise the use of that strength of insulin which contains the requisite number of units for one dose in 0.25 to 0.5 c.c. Thus a dose of 20 units is best furnished in 0.25 c.c. of 80-unit strength, or in 0.5 c.c. of 40-unit strength. The dose should always be stated in units and

* Read before the Alberta Medical Association, September, 1931.

not in c.c. It is surprising to find that many patients do not know their dosage in units but only by volume. In some patients a skin reaction occurs in the site of the injection. It is advisable for them to try insulin from a different maker or the special insulin now prepared for such cases.

2. An insulin syringe of 1 c.c. capacity, calibrated for 20- and 40-unit insulin. Instead of the metal retainer for the plunger a smear of vaseline on the upper part of the plunger is simpler. This also serves to seal in the plunger, and so prevents leakage of the insulin back past the plunger.

3. A second syringe of glass, of 2 c.c. capacity. It need not be calibrated. It is used to wash the needle and to carry it between doses.

4. Hypodermic needles. The stainless steel ones ½ in. long and of No. 27 gauge are recommended.

5. Seventy per cent alcohol to disinfect the skin and the needle. Alcohol is preferred to iodine or carbolic acid for the skin, and to boiling for the syringe, which really does not need to be disinfected as the insulin contains an antiseptic (one-tenth of one per cent of tricresol). The alcohol is conveniently kept in an emptied insulin vial with its rubber stopper. Always on emptying an insulin vial its label should be scraped off or defaced.

6. A cardboard, wooden or metal box with a cover, and of suitable size and shape (about 5 x 2 x 1 in.), to contain the foregoing outfit. A layer of cotton batting may be laid in the box as packing.

PROCEDURE

(1) Wash your hands well with soap and water. (2) Uncork the alcohol and tip it against the top of the insulin vial and against the skin where the injection is to be made. Recork the alcohol. (3) Place the needle on the syringe and draw into the latter as much air as equals the volume of insulin to be given. (4) Insert the needle into the insulin vial through the stopper still wet with alcohol, expel the air into the vial, invert it and then draw in the dose. If some air remains in the syringe take in excess of insulin and then expel this excess and the air back into the vial. The very last bit of insulin can be extracted from the vial by inserting the needle point just into the hollow inside the stopper. (5) Pinch up a fold of the skin still wet with alcohol, insert the needle through the skin (with a straight thrust to avoid bending the slender needle) and inject the dose subcutaneously. For self-administration the calf or the thigh is easily reached. When a second person gives the dose it is well to give it in the arm. It is advisable to change from place to place in order to avoid the risk of tissue atrophy. (6) Some insulin will remain in the needle and in the nipple of the syringe. This is saved by drawing back the plunger (after the needle has been withdrawn from the skin) until a bubble of air appears in the lower end of the syringe. The needle is then detached and in its place a rubber cap is placed on the nipple of the syringe. An insulin vial stopper is exactly suited for this capping of the syringe. The insulin thus left in the syringe goes into the next dose. (7) Wash the needle by putting it on the second syringe, which is first half-filled with air; insert the needle into the alcohol-vial, force in the air, detach the syringe, leaving the needle still in the stopper; quickly invert the alcohol for a moment to allow some to fill the needle, then erect the vial and let the excess air escape through the needle. Finally, attach the syringe again to the needle, withdraw the latter from the alcohol, and leave it on the dry syringe. Lay everything back in the box as you finish using it, to avoid re-handling. This is in the order: insulin vial; insulin syringe, capped; alcohol vial; and dry syringe carrying the needle.

DISCUSSION

The use of alcohol avoids the need of having the paraphernalia for boiling the syringe and needle; it wastes no insulin; it is safe as well as simple. It has been used by two patients about twelve thousand times without a single instance of infected needle puncture. One of these patients is a dentist, the other a housewife.

The whole procedure of giving a dose takes about one minute by the watch, as against say 10 minutes when boiling is involved. This saving of nine minutes twice a day adds up to nine hours a month or four and a half days per year per patient. If the time taken to do a thing is a fair measure of the trouble of doing it, this method is ten times as simple and easy as the one in which the syringe and needle are boiled each time. With the alcohol method the patient can take a dose of insulin with almost no embarrassment when away from home, as at a banquet, dinner party, picnic, or on a trip.

COLOUR SENSITIVITY IN MEDICAL STUDENTS

BY MADGE THURLOW MACKLIN, A.B., M.D.,
London, Ont.

Many different attributes have been regarded as essential to the medical student, ranging all the way from an excellent physique to a keen mental endowment, not to mention that elusive trait which we call personality, and which is to win the patients later on, but ability to diagnose colours has not been regarded as one of the tools of his armamentarium. However important colour vision may be to the railroad engineer, it has not been looked upon as of

paramount interest to the practising physician. The recent article by Tocantins and Jones* on this subject shows how very necessary colour sense is to the medical student and practitioner.

After having read their article I was so impressed by the value to the student of a normal colour sense, that I began testing a group of medical students with the Ishihara colour plates, which have the advantage of being a most delicate test, and the most easily applied. Students who have passed the Holmgren wools test with ease have been shown to be deficient by this test. The subject does not match or identify colours in this test; he merely reads numbers. These numbers are made up of coloured dots of varying sizes and intensities of colour set in a background of dots of the same shapes and intensities of colour. The figures differ in colour from the background. Thus the persons who have correct colour sense easily read the figure; those who have diminished colour sense, and who have, unconsciously or otherwise, learned to rely upon the varying intensities of light and shade for diagnosing colour, are unable to pick out the one set of coloured dots which mark the number, and so see nothing on the page.

I tested 125 students and found that 10 of them were practically totally red-green blind, and that four more had slightly less marked defects in colour vision. This was an incidence of 11 per cent, much higher than the figures given for the incidence of colour blindness in the text-books of physiology. Many of these students when questioned later admitted that it was very difficult for them to detect Gram-negative bacilli in a smear; that when given an unknown smear containing acid-fast tubercle bacilli they usually failed to find them; that in clinical chemistry, the end-points of acid titrations were hard to read. The diagnosis of histology and pathology slides was also difficult, especially the latter, where the morphology of the normal tissue was often lost, and the ability to determine the lesion depended upon the finer appreciation of cellular detail brought out by staining reactions. Thus, one student stated that not infrequently laboratory diagnoses seemed a matter of imagination to him, a refinement of technique that the average person could not attain to, and which could after all be discarded. These laboratory tests were all colorometric.

Defective colour vision should not be a bar to medical work, however. If the student is informed of his defect at the beginning of his work, and realizes that in certain of the laboratory fields he must not rely upon his own judgment, and that bacteriological work, and pathological chemistry, in both of which subjects colour appreciation is most essential, should not be chosen as his life work, then he will get along fairly well if he is a keen student. For two years the students ranking highest in histology have been totally red-green blind. They learned the morphology of the section, and did not depend merely upon the general staining reactions to help them, as some students do.

On the other hand, one of these lads stated that his hæmoglobin readings varied from those of the other students by as much as 15 per cent; he had great difficulty in seeing tubercle bacilli in a smear, (a dangerous failing when a diagnosis of active tuberculosis is being considered); and he could not detect cyanosis of the skin, although it was pointed out to him by the instructor. Others stated that they could not make a determination of gastric acidity, nor of phthalein excretion because they could not read colours as readily as they should. When one considers that so much of the laboratory technique depends on colour sense, one sees how handicapped such a person would be. Cyanosis, jaundice, fine rashes, bronzing of the skin, the pallor of anæmia, petechiæ, lead lines on the gum, urticarial lesions, all would be hard or even impossible to see. Differential blood counts would be difficult, not when the blood was normal, in which case it would make no difference, but when the picture changed, for eosinophiles are to these persons indistinguishable from neutrophiles; some of the abnormal findings, such as basophilic stippling, would be passed over, and even the neutrophile itself might be hard to find were the smear lightly stained.

If the student knows his defect, he can be guided in a choice of his life work. He knows what he can do, and what he cannot. He knows that he will have to have certain of his laboratory tests made for him, if he wishes accurate results. On the other hand, knowing that certain observational data are not available to him, he relies more upon his other senses, his touch, his hearing. He may thus almost fully compensate for his defect. This, of course, applies to the keen student. If the student is mediocre and there is a question as to whether he will make good in the profession or not, and if in addition to his mediocrity he be found colour defective, then he should be definitely warned against a course of study, and the practice of a profession in which colour appreciation enters so largely into one's diagnostic acumen. A test which is so easy of application, which reveals whether the road ahead is to be beset by more than the average difficulties, and indicates infallibly those points at which the obstacles are to be encountered should be applied to every student as he enters upon the career of medicine.

* Tocantins and Jones, *Am. J. M. Sc.*, 1933, **185**: 243.

Editorial

CHEMISTRY IN MEDICAL EDUCATION

THE liaison between clinical medicine and chemistry, especially physiological chemistry, becomes closer every year. A glance at the examination papers set nowadays in courses of medicine at the more progressive universities demonstrates this very clearly; and books produced by internists and biochemists in collaboration have recently become a striking feature of publishers' lists. There are those who deprecate this tendency, and deplore the alleged passing of the "old-fashioned doctor" who is supposed to have glanced at the patient's tongue, thumped his chest, and snapped out an infallible diagnosis. It may be suspected that this point of view is determined partly by the difficulty in interpreting laboratory reports, and partly by a feeling that *ex cathedra* decisions, mysteriously arrived at, are more dramatically impressive than a judicious weighing of the objective findings of analysis. The only tenable objection to the widest possible use of chemical or other laboratory aids to diagnosis is that it involves considerable and often needless expense. To this it may be replied that if, on unpredictable though possibly rare occasions, the laboratory supplies unexpected and vital information (and this claim can hardly be denied), it needs no other justification for its existence and participation in the study of the cases. The physician who would not hesitate to employ a therapeutic measure which could not be harmful and might well be highly beneficial should not regard diagnostic measures in any different light.

Granted then that chemistry requires a place in the medical curriculum, how large is the share which it may claim of the undergraduate's time and attention? There are large tracts of biochemistry with which clinical medicine has *at present* no traffic, and regions of the domain of chemistry with which the biochemist is rarely concerned. Is it not possible to confine the study of biochemistry to those topics which will at once be re-echoed in the clinical instruction, to found a sufficient understanding of the fundamental nature of such diseases or symptoms as acidosis, cyanosis, creatinuria, xerophthalmia and the like upon the slenderest possible pyramid of preliminary learning? This question is asked by undergraduates more often than by graduates, and surely it indicates an entire misconception of the nature of the permanent profit which the student may hope to derive from his contact with the sciences, and of the uses to which this profit should be put. Surely the primary object in leading the medical student through his brief scientific training is not so much to make easier for him the study of the quasi-chemical problems which he may meet in the next two or three years of his course, and which, it is to be hoped, will be adequately explained to him at the time, but rather to lay a broad general foundation on which he may securely build a real understanding of such new problems or new developments as may confront him later at any time in the practice of his profession, when the time and the ability to delve down to fundamental ideas are no longer readily available. Thus the modern trends of thought in questions of calcium metabolism are relatively lucid to him who can recall something of the simple laws governing the precipitation of an insoluble salt such as tricalcium phosphate, and unintelligible to him who can not. Or again, it is not impossible that in a few years the up-to-date internist may speak of rH, as a measure of the capacity of living cells to oxidize food materials, as glibly as he now speaks of pH; and those who can find a background of familiar general ideas about oxidation behind this esoteric symbol will indeed be fortunate. The man who has not played chess since boyhood will have forgotten the intricate opening gambits or the elaborate mating traps, but he will still "know the moves" and will be able to make some sort of suggestion when confronted with an unfamiliar position, or to understand the beauty of some unexpected sacrifice when it is demonstrated; the practitioner who can no longer

help his son with Cæsar or Livy may retain enough Latinity to dissect some new polysyllabic monster of medical nomenclature. In the same way, he who no longer remembers a single constitutional formula or atomic weight may yet be able to find some guiding fundamental principle in an emergency, or to understand without too much labour the significance of some new contribution to medical science.

If, then, the object of the chemical apprenticeship is to inculcate a relatively small number of fundamental principles, would it not be possible to reduce the time allotted to chemical studies in the curriculum by eliminating all minutiæ and concentrating on ideas that are really far-reaching and important? To this plausible suggestion, however, another denial must be returned; and for two reasons. The first is that it ignores a rule which, tacitly rather than overtly accepted, governs all didactic instruction to-day. The rule states that you must place before the student a hundred facts or ideas, in the expectation that he will remember perhaps twenty of them at the time of his examination, and perhaps five of them a year later. Whether this patent inefficiency is a fault of our present educational methods, or whether it is one of the characteristic "anfractuosities of the human mind" it might be hard to say. But experience shows that the rule is of wide application, and that the unfavourable ratio between introduction and acquisition is not to be improved by diminishing the amount of material introduced. The hall-mark of the successful teacher is not so much his ability to improve this ratio, as his ability to ensure that the ideas which are permanently retained are those which are of greatest value. This touches the second objection to the proposition which begins this paragraph. The ideas which are of greatest permanent value are not those which are printed in italics in the first page or two of the text-book of chemistry; not Boyle's Law nor the formula of ethyl alcohol; they are conceptions of the nature of scientific method, of the process of reasoning in science, of the point of view—conceptions not easily pinned down on the printed page nor compressible into a few adhesive sentences; conceptions certainly not to be acquired with the parrot-like reiteration of a few chemical axioms or generalizations, but rather to be imperceptibly assimilated in the patient and familiar handling of those very minutiæ of experimental fact, those refinements of controversy which the superficial would banish from the course. It has been well said that the attitude of the physician to his patient should be that of the scientist to his problem; in the setting-up of hypotheses, the testing of them by the available evidence, the selection of the most stable (still envisaging the possibility of recantation) as a guide for future action; the patterns of thought are the same in the two cases; the analogy may be pursued in detail. The teacher of chemistry, or any other experimental science, who has familiarized his students with these thought-patterns has done much for them—all the better, of course, if he can do it with examples which are interesting in themselves and directly applicable to the present or future problems of his hearers.

D. L. THOMSON.

THE TREATMENT OF HAY FEVER WITH ACID

PROFESSOR Beckman, of Milwaukee, for some years past has been advocating the use of inorganic acids by mouth in the treatment of hay fever.[1] His advocacy has now developed[2] into an enthusiasm which leads him to make claims for this method that will seem extravagant to many who have even a moderate experience in treating the pollen sensitizations. Professor Beckman would have us believe that better results are obtained by simply taking large quantities of dilute hydrochloric and nitric acids than by the more laborious procedure of desensitization with the appropriate pollen extract. His statements are inclined to be dogmatic, but that is not enough to make them convincing. He begins by taking exception—satirically, but firmly—to the commonly employed method of describing

1. Originally suggested by Bishop in 1893, *J. Am. M. Ass.*, 1893, **21**: 809.
2. *The Lancet*, 1933, **1**: 1227.

results of treatment other than completely successful or complete total failures: "slight" or even "moderate" improvement he thinks should not be accepted. That is a high ideal to hold out, but patients being what they are, and our knowledge of the pathology of hay fever being what it is, we contend that there *are* grades of improvement short of absolute freedom, and yet better than none at all; and these can be recognized by anyone who takes the trouble to inquire. Of course, they are hard to define and cannot be translated into graphs, but much of our clinical estimation suffers from the same disadvantage, as some might term it.

Professor Beckman then does his best to prove his claims for the acid treatment. He tells us that in comparison with the desensitization method he obtains a higher percentage of cures, and almost exactly the same proportion of failures, which is not a startling statement when it is found that his group of 518 cases is made up largely from reports sent him by a number of physicians in general practice whose chief claim to accuracy seems to have been that they were "sufficiently interested to study their cases carefully". We presume that the same qualification is to be found amongst those whom Professor Beckman terms "allergists", whatever that may mean apart from their employing the method of desensitization. We are not told, however, what is meant by "cure", or whether there is any permanency of result, or how the acid acts, but we are told that the results are good, and we are encouraged to believe that it is because the large doses of acid bring about changes in the acid-base balance of the tissues which check the hay fever. This latter, however, is admittedly only a theory.

Even an empirical method may succeed, and it will be welcomed to the full extent of its success. Unfortunately, there is not the evidence to show that the acid treatment is any more effective than that by desensitization. Is it even as good? The point is debatable. Desensitization with all its difficulties still holds out most promise, obscure as some of its principles may be. H. E. M.

Editorial Comments

The Control of Degeneracy

The address by Dr. Herbert Bruce in this issue is on a subject which has rarely been discussed in our columns, and yet, as Dr. Bruce impressively demonstrates, it has implications of the most vital nature. He makes out a strong case for sterilization of the feeble-minded, supporting it by figures which show only too dramatically how rapidly these are increasing. In the attempt to sharpen his effect, however, he has hardly laid enough emphasis on the difficulties which surround the efforts to deal with the problem. It is well to recall the sinister family history of the infamous Jukes—to say nothing of all the other notorious families, such as the Kallikaks, the Nams, the Zeros, the Dacks, the Piney Folk—and to meditate on how much better the world might have been if these lines had been, to use a commercial phrase, early discontinued; for there can be no doubt that much misery and crime has been perpetuated by them. But we must not expect that the sterilization of such types will be a very effective measure in checking the increase of the mentally unfit. The statement has been made that "if every mental subnormal now living were sterilized, the resulting decrease in their numbers a generation hence would be insignificant."* This is because mental degeneracy may develop in the progeny of those who themselves show no appreciable signs of it but have latent in them the qualities or defects capable of producing it. If then sterilization is to be effective it must take in a much larger group than the obvious mental defectives, and at once it will be asked, Who are the mentally unstable? The question is always being asked, and it has never yet been satisfactorily answered, for the very good reason that our methods of selection are inadequate. We need much more knowledge of mental disease. At the same time we feel that Dr. Bruce has performed a timely service in bringing the matter before a lay audience.† Full realization of the problem is necessary if it is to be dealt with.

H.E.M.

* Landman, J. H., Human Sterilization, Macmillan, Toronto, 1932, p. 195.

† We would draw attention to the resolution passed at the last annual meeting of the Ontario Medical Association, to the effect that voluntary sterilization of the unfit should be legalized in the Province of Ontario (this *Journal*, 1933, **29**: 86).

Air Traffic and Infectious Disease

That infectious disease, particularly in times of epidemic, may on occasion be introduced into a country at a seaport town, and that it tends to extend along routes of communication, whether by land or sea, are statements now taken as axiomatic by public health authorities. The danger of this, always present, is nowadays enhanced owing to the greater speed of transportation and the shortening of routes of travel by means of canals. It is likely to be still further increased in the future when traffic by the air becomes more popular. The reason, of course, is that the amount of time consumed in passing from terminus to terminus has in many cases come to be well within the incubation period of the more important infectious diseases. Here in Canada the danger is at present not great, for the airways traffic is mostly interior and with the United States, where sanitary regulations are well under control; communication by the air with Asia and Africa does not enter into the problem. With some other countries, however, the matter is more serious, Australia, for example. This country is within easy steaming reach of some eastern Asiatic ports, and within still easier reach of the European and Asiatic airways systems at Singapore. Thus, within the average incubation period of small-pox (twelve days) a vessel can reach Thursday Island, just to the north of Australia, from such places as Bangkok, Rangoon, Hong Kong, and Shanghai. Within the incubation periods of cholera, plague, and yellow fever (seven days) the nearer ports of Java, Borneo, Celebes, and the southern Philippine Islands come under consideration. In other words, a patient who joins vessels at these points may reach Australia before he is obviously ill. The risks arising from maritime traffic are well known and at the present time are well guarded against. Can we say the same about airways traffic? Apparently "Yes", so far as Australia is concerned. The Department of Health of that Commonwealth has for many years made a serious study of these risks. Australia was the first country in the world (in 1920) to apply the quarantine code to aircraft, by defining a "vessel", for purposes of quarantine, as "any ship, boat, or other description of vessel or vehicle used in navigation by sea or air." The findings of the International Sanitary Convention for Aerial Navigation provide a code in some ways analogous to that of the existing International Sanitary Convention for maritime traffic. Several new principles are invoked, however, particularly in regard to aircraft coming from areas infected with yellow fever. Bills of health and other official papers, for instance, are simplified by the endorsement of the log-book carried by each aircraft.

Of course, the amount of risk involved in importation of disease varies with the nature of the case. Diseases that are communicated by animals, such as rabies and psittacosis, are easily dealt with along the usual lines. Plague is a menace of the rat. It is unlikely that rats will be harboured on aircraft or in the types of cargo suitable for transport by air. In the case of yellow fever the risk of infection through human cases or infected *Stegomyia* mosquitoes, crossing by aircraft from west to east Africa and so into Asia and Australia, has been foreseen by the International Sanitary Convention for Aerial Navigation and the Health Organization of the League of Nations. Investigations show that mosquitoes may travel in fuselage and cabin, but they usually disappear in flight. None the less, "demoustication" of hangars and aircraft has become a recognized procedure. Cholera is a risk connected with the incubating case, the carrier, and, possibly, food stuffs. Fortunately, the short incubation period of cholera is a favourable factor. The type of passenger and crew likely to be on board aircraft is, according to maritime experience, unlikely to contract or convey this infection. Epidemic influenza, dysentery, malaria, dengue, and cerebrospinal fever may also be mentioned as presenting special problems from the public health point of view.

Another problem, too, that arises in connection with air travel, of a different kind, however, is the proper disposal of excreta. We may, perhaps, forecast that in the future we shall see an increased speed and range of aircraft and an extension of regular line services throughout the world. This is likely to bring out new problems in connection with public health and quarantine and to extend and modify old ones.

A.G.N.

St. John Ambulance Association and the Canadian Medical Association

The President and Members of the General Executive of the St. John Ambulance Association have expressed to us their keen appreciation of the affiliation which was arranged for their Association, with the Canadian Medical Association at the Annual Meeting at Saint John, New Brunswick, in June, 1933.

Col. J. T. Clarke, the Director General of the St. John Ambulance Association, while expressing his gratification at the affiliation, points out that the success of the humanitarian effort being made by the Order of St. John in Canada in the training of large numbers of people in First Aid and Home Nursing depends upon the amount and the character of the cooperation to be obtained from the medical profession. He indicates four ways in which the doctors throughout Canada can help, *viz.*:—

1. By assisting in the organization work of

Provincial Councils, and of local "Centres" which come within their individual sphere of influence.

2. The senior members of the profession, by encouraging their young and active confrères to take on the instructional work of St. John as one of their privileges in the service of the public.

3. Medical men in general to take on the work of lecturers and examiners, making full use of well qualified St. John Ambulance Association Instructors for demonstration and practice.

4. When giving the lectures, to adhere strictly to the subject covered in the St. John Text-Book, avoiding all attempts at more advanced instruction; always keeping in mind that we are not trying to produce medical experts, but to make a large number of people expert in First Aid, in order to enable them to carry on for the benefit of the patient until a doctor's services become available.

The interest of the St. John Ambulance Association is heartily commended to the attention of the medical profession. The work of the Association is of first-class importance. We express the hope that the affiliation of the two associations will be more than a mere bond of courtesy expressed on paper, and that it will find practical expression in action and helpful cooperation along the lines suggested by Colonel Clarke.

A.G.N.

Medical Archives

The Committee on Medical Archives of our Association is particularly anxious to elicit the effective cooperation of the medical profession throughout Canada. In the pages of the *Journal*, from time to time, we have published articles dealing with the history of medicine in our different provinces, as well as biographical sketches of by-gone physicians. In this way it is hoped to preserve for all time facts relating to our profession and medical colleagues which would otherwise be lost. But this, valuable as it is, does not go far enough. There are doubtless many little scraps of information extant, which, while not vastly important, or not lengthy enough to merit the dignity of a formal article, still might properly be kept on record. Such would be of value in compiling more ambitious works on medical history and biography later on. Of particular value would be any notes, programs, manuscripts, newspaper clippings, menu cards, records of debates and medical legislation, etc., relating to our own Association, especially in its earlier career. But besides these, which may properly be grouped under the term "Archives" there may be other items of a different character which deserve preservation. We refer to portraits of Canadian medical men or paintings, engravings having a medical interest, surgical instruments and medical appliances, and personal articles belonging to distinguished members of the profession; old books (provided that they are very old!); case books; account books, and the like. Medical men could aid the Archives Committee materially by communicating to them the fact of possession of any such articles. Better still, they could send them in at once to the Committee. In some cases they could, doubtless, devise articles of special value to the Association in their wills. In this way a large body of valuable material could be accumulated for our Association, and it will be well taken care of. The Chairman of our Archives Committee is Dr. C. F. Wylde, who will be pleased to receive all communications at the Library of the Medical School, McGill University, Montreal.

A.G.N.

Recent Affiliations with the Canadian Medical Association

We desire to record our gratification at the affiliation with our Association of certain public bodies of great influence and importance which was consummated at the recent Annual Meeting in Saint John. These bodies are the St. John Ambulance Association, the Canadian Tuberculosis Association, and the Canadian National Committee for Mental Hygiene. The desire for affiliation in itself implies that all the parties concerned feel that they will derive some benefit from such a relationship. The Associations referred to will be the stronger for being linked with the largest body representing organized medicine in Canada, and the Canadian Medical Association will also gain by the widening of its sphere of interest. The old adage, L'Union fait la Force, may appropriately be quoted in this connection.

A.G.N.

It is contrary to what is proper, and against the opinion of sages, to partake of medicine by guess, and to go after a caravan without seeing the road. The Imaum Murshid Muhammad Ghazâli—upon whom be the mercy of Allah—having been asked in what manner he had attained such a degree of knowledge, replied: "By not being ashamed to ask about things I did not know."—*Maxim LXXIX* of the Sheik Sa'di of Shiraz.

Retrospect

THE NATURE OF NON-CARDIAC ŒDEMA

BY J. FEIGENBAUM

Montreal

For clinical purposes non-inflammatory œdema has for many years been divided into that of cardiac and that of non-cardiac origin. In the latter group were included the œdemas observed in nephritis (in the absence of cardiac failure), in the severe anæmias, in states of advanced malnutrition, and in nephrosis. It is in nephrosis particularly that a peculiarly massive œdema has been observed for which no adequate cause could be found, although numerous probable theories have been advanced. During the past four years, however, a good deal of convincing experimental work has been done which sheds much light upon the whole subject of non-cardiac or nephrotic œdemas.

The first and perhaps the most significant contribution to the study of œdema came from Starling[1] in 1895. He proved rather conclusively that the proteins of the plasma exerted a definite osmotic pressure, much in the same way as did the crystalloids. Œdema would ensue when the balance between the hydrostatic pressure and the osmotic pressure within the capillaries was disturbed. Thus, in a consideration of certain types of œdema in which changes in osmotic pressure had occurred, the plasma proteins were important factors. In 1917, Epstein[2] suggested that the œdema occurring in some forms of nephritis was due to the loss of proteins through the kidneys, and a consequent reduction in the osmotic pressure of the plasma. He was able to furnish clinical evidence for this assumption by feeding patients with nephritis and œdema a high protein diet and noting the disappearance of the œdema. This method finally gained great vogue in the treatment of the œdema in nephrosis.

The experimental proof that a reduction in plasma proteins will result in œdema was presented first by Leiter[3]. Employing about forty dogs, this investigator succeeded in producing well-marked œdema in almost all of his animals after plasma-phaéresis (πλάσμα = a thing moulded; ἀφαιρέω = to withdraw). This was accomplished by bleeding the dogs, centrifugalizing the blood, discarding the plasma, replacing this by Locke's solution, and re-injecting the suspension of solution and cells into the animals. Thus the protein content of the plasma was depleted. Plasma-phæresis was performed once or twice daily, and œdema appeared between four and seven days after starting the experiments. Leiter has been very careful to point out that the œdema thus produced is similar to that encountered in many clinical conditions, inasmuch as the œdema fluid is extremely low in protein content. This work has been corroborated and amplified both by laboratory investigators and by clinicians. Barker and Kirk[4] repeated Leiter's experiments and obtained almost identical results. Shelburne and Egloff[5] arrived at the same conclusions also. In addition they stressed the importance of certain electrolytes in the pathogenesis of œdema, particular emphasis being placed upon the rôle of the sodium ion.

In the train of the pure laboratory work, there have been many clinical reports confirming this work. Peters[6] and his colleagues have been able to show that a reduction of serum albumin is not confined to nephrosis, but occurs in all those types of nephritis associated with œdema. They found a tendency for œdema to develop when the total proteins reached the "critical level" between 4 and 5 grams per 100 c.c. of blood. Moreover, in these cases of nephritis, as in those of nephrosis, the depletion of the serum proteins was at the expense of the albumin fraction of the plasma. Moore and Van Slyke[7] discovered that a definite relationship existed between the total protein content of the plasma, and the appearance of œdema. Weech and Ling[8] found a reduction of serum proteins to a critical level in several cases of nutritional œdema. The patients studied were native Chinese who had developed œdema following starvation. A short period on diet with sufficient protein brought about a return of normal protein values in the plasma, with a disappearance of the œdema. Finally, Keefer and Myers[9] were able to show that œdema occurred in patients with anæmia when the plasma proteins had been reduced sufficiently.

Critical scrutiny of the fundamental work upon which the newer theory of the origin of non-cardiac œdema rests reveals it to be sufficiently decisive to remain an important and lasting contribution to the subject.

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2. EPSTEIN, *Am. J. Med. Sci.*, 1917, **154**: 638.
3. LEITER, *Proc. Soc. Exp. Biol. and Med.*, 1928, **26**: 173. *Ibid.*, *Arch. Int. Med.*, 1931, **48**: 1.
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9. KEEFER AND MYERS, *Trans. Assoc. Amer. Phys.*, 1932.

Special Articles

THE CAUSATION AND TREATMENT OF ARTHRITIS AND ALLIED CONDITIONS*

REVIEWED BY W. FORD CONNELL,

Kingston

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In searching for infective foci, the following demand most careful attention:—

The teeth—apical infections; capped or dead teeth.

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The nasal sinuses—especially the maxillary antra—antral puncture and bacteriological examination being required.

The pharynx — a general infection of the mucous membranes may be present, apart altogether from any local infection in the tonsils or sinuses.

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The urogenital tract—the urethra, prostate, seminal vesical or kidney pelves being possible sites. In females, cervical erosions and latent salpingitis must not be overlooked.

The recent American work in support of the infective origin of arthritis has not been overlooked; positive cultures of streptococci have been obtained after long periods from large quantities of blood; also specific streptococcal antibodies have been found. All this work, however, needs confirmation, with careful controls.

The lack of uniformity in existing schemes of classification was especially troublesome when the question of morbid anatomy was considered. It is stated that collections of lymphocytes in the synovial membranes, subchondral connective tissue and capsule occur *only* in rheumatoid arthritis; in this condition, there is first round-celled infiltration and proliferation of the synovial membrane which

* An abstract of the Report of the British Medical Association Committee, *Brit. M. J.*, 1933, **1**: 1033.

TABLE I.*

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Infection	Not proven	Septic focus	Not proven	Present only in secondary form
Prodromal symptoms	Present	Absent	Absent	Absent
General condition of patient	Ill and emaciated	Affected in later stages only	Florid and healthy	Tending to show signs of senile changes
Joints affected	Small joints; tendency to spread centripetally	Any joint distribution; tendency to symmetry	Predominantly knees; also 1st carpo-metacarpal joints	Large joints, especially hip
Appearance of joints	Fusiform swelling accentuated by wasting of surrounding tissues	Fusiform swelling accentuated by wasting of surrounding tissues	Pouched swelling of knees	May be swollen more or less symmetrically in large joints; smaller joints tend to be nodular
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Muscular wasting	Marked	Variable	Absent	Marked in late stages only
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The biochemical changes resulting from arthritis are fully considered. As regards the blood, determination of the sedimentation rate of the red cells is perhaps the most important procedure. The rheumatoid arthritis group showed the quickest sedimentation rates, and also the least improvement in the rate after treatment, which may be taken as an indication that the basic condition had been practically unaltered by therapy. Chronic villous arthritis somewhat resembled the rheumatoid arthritis cases in the results obtained. Of the osteo-arthritics, only a minor group, usually poly-arthritic cases, showed raised sedimentation rates. Spondylitis ankylopoietica gave raised values, while spondylitis osteo-arthritica gave practically normal readings. The results in fibrositis were variable. In sciatica, if the nerve trunk alone were involved, the rate was normal; where the nerve root is involved in the perineuritis, the rate is raised.

Investigations of blood pH, uric acid, magnesium, inorganic phosphorus or cholesterol content, yielded negative results, as did the various liver function tests and investigations of blood urea and renal function tests. Blood groups were found to be insignificant. The CO_2 content of the blood was lower than normal in the rheumatoid arthritis group. This same group exhibits "glucose intolerance," showing a typical "lag curve" when a glucose test meal

Special Articles

THE CAUSATION AND TREATMENT OF ARTHRITIS AND ALLIED CONDITIONS*

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TABLE II.*

—	*Spondylitis Ankylopoietica*	*Spondylitis Osteo-arthritica*
Onset	Gradual; sometimes rapid	Slow, generally; sometimes sudden
Age incidence	20-50	40-70
Sex incidence	Males almost exclusively	Males chiefly
Injury and strain	Not constant, and effect indirect	Important
Infection	Important	Not constant, and effect indirect
Sedimentation rate	Increased	Normal
X-ray	Osteoporosis, ossification of ligaments	Degeneration of bone; osteophytes
Sacro-iliac joints	Early affected	Not necessarily affected
Deformities	Common; sometimes severe	Rare; seldom severe
Ankylosis	Characteristic, extending to ribs, sacro-iliac joints, and hips	Localized, not extending to other joints
Pain	Often severe	Rarely notable, except after injury or if nerve roots are pressed on
Stiffness	Progressing to absolute immobility ("poker back")	Never very extreme

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is administered; the defect is in the tissues and their blood supply, rather than in the pancreas; owing to vasoconstriction, glucose is absorbed and utilized at a slower rate than normal. In both rheumatoid arthritis and spondylitis ankylopoietica the total blood proteins are 1 to 1.5 per cent higher than normal. In all cases showing a raised sedimentation rate there is, of course, a reduction in the albumin-globulin ratio, with a rise in the fibrinogen content of the serum. Blood phosphatase is raised only in spondylitis ankylopoietica, possibly owing to extensive ligamentous ossification. No significant urinary changes were found in any of the groups, and the constitution of the sweat in all was found normal. The incidence of gastric hypo- or a-chlorhydria in all these cases is certainly very high. This is possibly important from an infection standpoint, in that a germicidal barrier is thus removed.

The radiological appearances of the various types of arthritis are assuming more and more importance as a means of differential diagnosis. Briefly, rheumatoid arthritis shows an early generalized osteoporosis, later, destruction of cartilage and articular bone, and, finally, subluxation and ankylosis. Osteo-arthritis, in the hand, shows loss of cartilage, irregularity and obliteration of the joint space, with osteophyte formation; in the hip, the appearances are most variable from case to case, the changes noted being summed up as, (1) loss of cartilage, (2) new bone laid down in the acetabulum, or as fringe osteophytes, (3) cavitation of the acetabulum or femur, and (4) local osteoporosis or osteosclerosis. In spondylitis ankylopoietica there are early osteoporosis of the vertebral bodies and early ossification of the intervertebral discs and ligaments. Softening of the vertebral bodies leads to their fusion, with a resulting bamboo-like appearance. In spondylitis osteo-arthritica osteophyte formation is the prominent feature. Gout may be differentiated from any of the above by the typical clear "punched out" areas of sodium biurate near the articular ends of the bones.

The chief points in the differential diagnosis of the various conditions dealt with have already been set out in table form. It is also necessary to distinguish the forms considered from other varieties of arthritis, and to distinguish the pain and limitation of movement produced by arthritis or fibrositis from similar symptoms produced by other conditions. Acute rheumatic fever may sometimes only with difficulty be distinguished from rheumatoid arthritis. In the former, the heat and redness of the joints, the frequent cardiac involvement, the negative x-ray features, and the satisfactory response to salicylates, will usually differentiate. Still's disease is considered to be synonymous with primary rheumatoid arthritis. Tuberculous arthritis produces a stiff and swollen, but never an acutely inflamed joint. X-ray will show tuberculous disease of adjacent bones. Aspiration of the joint fluid with guinea-pig innoculation may be necessary. Other conditions which must be eliminated are gout, gonococcal arthritis, arthritis in specific infections as pneumonia, enteric fever and dysentery, pseudo-coxalgia (coxa valga) in young subjects, Charcot's joints, hæmophilic arthropathy, due to effusion of blood into a joint, hypertrophic pulmonary osteo-arthropathy, intermittent hydrarthrosis and other allergic conditions, and syphilitic arthritis.

It is pointed out that headache may often result from fibrositis of the neck or scalp, when tender nodules will be found in the affected tissues; head or neck pain is frequent in either form of spondylitis. Thoracic pain may be due to intercostal fibrositis, as well as to pleurisy, aneurysm and cardiac disease. Similarly, fibrositis of the abdominal muscles may give rise to abdominal pain. In either the thorax or abdomen unexplained pain may be due to herpes zoster, and should not be attributed to fibrositis unless tender nodules are found.

In diagnosing the cause of pain in the limbs, intermittent claudication, thrombo-angiitis obliterans, and the lightning pains of tabes, may all be confused with fibrositis or with sciatica. Diseases of the bones, as chronic osteomyelitis, produce pain on pressure over the bone, rather than over the joint. X-rays are always valuable.

Any prophylactic treatment for the group of diseases under discussion must obviously be related with the multiple etiological factors concerned. Attention must be paid not only to the "seed"—bacteria, their toxins and possible allergic reactions—but also to the "soil"—the resistance of the body. Any general measures to raise the resistance of the host are largely sociological problems. Of the known exciting factors, infection is much the most important, being incriminated by some as responsible for more than 70 per cent of cases of chronic arthritis. When focal sepsis is a factor, either metabolic upset, endocrine imbalance or absence of vitamin A is probably also concerned.

Vaccines, properly used, are highly useful in many cases. They should never be given without, first, a full clinical investigation of the case. Vaccines may be autogenous, usually streptococcal, or "stock." Certain practitioners advocate a vaccine containing all the possible streptococci associated with rheumatic disease (over 150 varieties), with two types of white staphylococci which have also been incriminated. A course of vaccine will often enable a patient to improve sufficiently to make safe the removal of septic foci. In such a circumstance, the initial dose should not be more than 20,000 to 50,000 streptococci. With no septic foci, half a million may safely be used. The optimal dose is rarely more than 10,000,000.

Drugs are of service in arthritis only for the relief of pain and, to a limited extent, in improving the patient's resistance. The salicylates have no specific action other than their analgesic power. Quinoline derivatives, as cincophen or atophan, must be carefully watched because of their toxic effect on the liver. Guaiacol carbonate appears to be one of the best intestinal antiseptics. Iodine in its various forms is widely used; the committee were not enthusiastic in its advocacy.

The following local injections are recommended in the treatment of lumbar fibrositis (lumbago): 20 c.c. of 10 per cent sterile glucose solution; 5 c.c. of 1 per cent quinine urea hydrochloride; 5 to 10 c.c. of 1 per cent novocaine. In sciatica the nerve sheathe may be injected with sterile normal saline, combined if desired with 10 per cent novocaine.

When any stigmata of hypothyroidism are present, thyroid treatment may produce great benefit. A certain number of cases in women may benefit from pelvic diathermy, suggesting that ovarian function may be at fault in these cases.

As regards diet, the first essential would appear to be an adequate supply of simple digestible food. No food is forbidden which the patient finds easy of digestion. Since the diet should contain adequate amounts of each of the essential vitamins, it should include milk, butter, eggs, meat, fish, liver and some fat; wholemeal bread, yeast extracts, fresh fruit and vegetables, raw and cooked. Foods outside this list may be freely indulged, except that in fibrositis and chronic villous arthritis, excess carbohydrate should be avoided, and in osteoarthritis, owing to the tendency to arterial degeneration, purines and excess meat should be avoided.

The physical methods of treatment are particularly stressed in the report. Heat in all its forms is indicated for the relief of pain. When stimulating effects are desired temperatures over 110° F. are used; somewhat lower temperatures are sedative. Massage is specially useful in fibrositis; in bed-ridden patients it is a substitute for active exercise; it should never be used in the stage of acute inflammation. Active, and later, passive, movements are indicated as soon as their use does not cause increased pain and swelling.

Electrical methods in use include diathermy, for heating the deep structures, ionization, to drive certain drugs into the tissues in fibrositis, etc., and ultraviolet rays, for their general tonic effect. Mineral waters of various types have been found of value by many sufferers from fibrositis and chronic arthritis. Many types of baths are also in use, particularly at spas. Spa treatment will often be helpful and is only contraindicated in the presence of acute arthritis, tuberculosis, severe cardiovascular disease, malignant disease or advanced renal disease.

Climate has little or no effect on osteoarthritis. Cold dry climates are certainly preferable for patients suffering from rheumatoid arthritis.

The orthopædic aspect of treatment is important and is fully discussed. It can here be only briefly reviewed. Immobilization in the optimum position of the affected joints is always to be secured in the acute stage. This will necessitate a firm hard bed in cases of spondylitis; hyperextension of the spine is always to be produced thrice daily, by means of a pillow under the thorax. In hip-joint disease, a splint with Bucks' extension may be necessary. The knee-joint may be prevented from assuming its characteristic deformity of flexion, backward subluxation of the tibial head and outward rotation of the leg, by simple weight and pulley traction in many cases; sometimes manipulation under anæsthesia will be necessary. The optimum position for the ankle joint is dorsi-flexion with slight inversion, best obtained by the use of a celluloid splint. For the shoulder joint, a position of 60 degrees abduction and 15 degrees external rotation should be selected. When the elbow is affected, it should be kept active as long as possible. The best position for fixation is 100 degrees extension, with mid-pronation of the

forearm. Where the bones of the wrist are involved, especially in old people, a protective leather wristlet will often serve to hold them in proper position. Steady prolonged traction of the finger tips in the line of the deformity is recommended for stiff fingers—never forcible manipulation under anæsthesia. The treatment of the chronic stages of all these conditions resolves itself into pure problems of orthopædic surgery.

After reviewing various national (continental) schemes for treatment, the Committee present a suggested national scheme for Great Britain. Early recognition, thorough early treatment and adequate follow-up are all essential. Moreover, it is recognized that the proper relationship between patient and family doctor must not be interfered with more than necessary. The family physician may well supervise the general régime and administer the necessary drugs and also any specific measures, in collaboration with the pathological department of a general hospital. Physical treatment may be carried out in hospital physiotherapy departments. Spa treatment, possible in England, is largely impracticable in this country. The orthopædic and general surgical departments of the hospitals would look after the orthopædic aspects of the cases. Occupational therapy, promoted by social service organizations, is important. Some central organization would of course be instituted.

In the concluding paragraphs of their report, the Committee offer various interesting suggestions for future research and for further professional education.

Men and Books

JOHN HUTCHISON GARNIER A CANADIAN NATURALIST AND PHYSICIAN*

BY W. V. JOHNSTON, B.A., M.D.,
Lucknow, Ont.

Dr. J. H. Garnier lived for nearly forty years in the village of Lucknow in the County of Bruce, and was one of the most interesting figures in the history of Western Ontario. He had one of the largest general medical practices of his time in that part of the province and enjoyed an enviable reputation as a consultant over a large part of three counties. He ranked very high as a naturalist, he was a writer of considerable merit, and last, but not least, I assure you he made such an impression on his community, both by his abilities and his eccentricities, that the memory of him there is almost as fresh to-day as when he was living. He died on February 1st, 1898, at the age of 75.

Dr. Garnier's mother was a French Roman Catholic. His father was a Huguenot and a member of a long line of distinguished military men. Because of religious persecution he fled with his wife from France to Scotland, where he obtained a commission as colonel in the English army. The family was one of wealth and culture, and into it in 1823 the subject of this address was born. This boy on growing up was sent to Dublin to receive his medical education. He was always an ardent Orangeman, and while in Ireland he became well acquainted with Daniel O'Connell, and in his later years was very fond of relating incidents from the life of that distinguished Irishman. He was sent to Paris for further study. Following this he spent several years travelling, visiting many lands, including Australia, India and South Africa. He came to Canada and established a medical practice at Hagersville, Ont. This did not satisfy him, so in 1860 he moved to the village of Lucknow.

He came to Lucknow only four years after the first settlers had arrived there. At that time the Counties of Huron and Bruce were owned by the Canada Company and were known as the Queen's Bush. They were an unbroken stretch of forest, full of game, with a few scattered settlements being carved out of the woods. The early settlers were chiefly crofters from the Highlands of Scotland and the Isle of Skye, with a few immigrants from Ireland and England. In such a locality and at such a time Dr. Garnier chose to live his life. Why a man of his training and culture should leave the homeland to dwell in a wilderness has remained a mystery. Rumour has it that he left Ireland as the result of a duel.

He was about 5 feet 10 inches in height, and weighed about 165 pounds. His shoulders were slightly stooped; his face somewhat longer than usual, with bright keen eyes. He was very vigorous in mind and body. His personality was remarkable and is rather difficult to describe. He was impetuous, hot-tempered, very brusque in his manner, and fond of practical jokes. He was very profane in his language and used alcohol sparingly—on most occasions. It is no exaggeration to say that his mannerisms were so extraordinary that many did not understand him. The children were terrified of the doctor whom they would see in the early morning going about town with a gun on his shoulder and warning them to keep at a safe distance. The farmers meeting him on the road would as likely as not receive a cut of his black snake whip across their shoulders. All learned to make allowances for the actions of the doctor. Perhaps a few incidents

*Read before the Academy of Medicine, Toronto, on Library and Historical Night, January 3, 1933.

We published some remarks on Dr. Garnier in the *Journal*, 1927, 17: 355, by Dr. A. J. Mackenzie. Dr. Johnston, however, has been able to add a great deal more. [ED.]

from his life will convey more clearly to you than mere generalizations the impression he made on those about him.

While driving along the road one morning he gave a young woman a ride in his buggy. He warned her that he was subject to fits and if one should come on she was not to be alarmed. Soon they came to a river and the doctor drove into the water so that the horse might have a drink. While it was drinking a fit seized him and he made it so realistic that the woman in terror scrambled out over the wheel and waded to shore.

As indicated above, we know very little of his life before he came to this country. However, there is a story, told on quite good authority, that one day a young man visited him in his office, engaged him in conversation on some pretext or other, and left without disclosing his true identity. The old doctor discovered next day that it was his son from England of whose existence no one in the village had known. He was so incensed at his son's behaviour that he pursued him to Goderich on horseback with a gun. Luckily the young man was not to be found.

While making a call at a country home he noticed some fine geese in a field and offered to buy one. The housewife refused to sell. The doctor went to get his horse, but before leaving he took his gun, which he always carried with him, and shot a goose. He returned to the house with it and the woman was now forced to sell it to him. Again, while hunting in the woods one day, he suddenly came upon another hunter by the name of Ross. With an oath he pointed his gun at Ross threatening to shoot him. Ross jumped behind a tree and the doctor proceeded to chase him from the cover of one tree trunk to another. Such was the reputation of the doctor that Ross really believed he was in danger of losing his life. The doctor ended the sport by calling upon Ross to stop acting like a monkey, and for the rest of his days he was known as "Monkey Ross."

Apparently in those days doctors had difficulty in collecting some of their accounts. I think you will agree with me that he had an original way of viewing some of these. It is known that on looking over his books at the end of the year, and coming to the name of a patient who had died penniless and still owing him he would write in the ledger "Gone to Hell". Dr. W. J. Stevenson, of London, who knew him well states that he was a very shrewd observer of men. He relates that in his student days he was sitting in Dr. Garnier's office when an old man entered, complaining of a sore shoulder and claiming to have been treated by another physician without relief. The doctor flew into a rage and gave him the customary address—that he should have known better than to have gone to another—that he would pay dearly for this, as his taxes were due and he was without money. Then with an uproarious laugh, and without any examination, he told the old man to pull off his coat and sit forward on the edge of the chair, and then he took off his coat and with a few manipulations of the knee in the axilla the dislocated shoulder was corrected.

These are only a few of the innumerable incidents that might be given to show the way in which he loved to appear to the public. His mannerisms were used evidently to keep the people from undue familiarity. Being a scientific man and a man of literary attainment he desired as much time as possible for the pursuit of his favourite studies. We may now turn to the work he did. He made most extensive notes of the habits and characteristics of the birds, mammals and reptiles. He was the foremost authority on cold-blooded vertebrates in Canada. He carefully collected and mounted the plants and flowers of the district. He carried on an extensive medical practice—so extensive that I am told the street in front of his house on Sunday afternoons looked like a village fair. He had an international reputation as an expert operator in cataract. He would remove the cataract with the patient sitting in a chair in his office. In place of the spud he had whittled a small concave piece of wood which he laid across the eye and by gentle pressure extracted the cataract. He was quite expert in the use of this simple contrivance. He was known throughout the district as being skilled in midwifery. He probably was the earliest doctor in that part of the country to own a pair of obstetrical forceps. They were a pair of perineal forceps and he usually carried them in his hip pocket. He always kept himself scrupulously clean, washing his instruments and forceps in whiskey before using them. His hands being constantly in methylated spirits used for preserving his biological specimens were equally clean.

His general practice was limited to some extent by his eccentricities, which terrified people. However, in a general way it may be stated that his opinion in consultation was valued very highly. When called in serious cases he would make the most of his opportunities by telling them that it now was a matter of desperate remedies—medicines to kill or cure. With all his brusqueness, to those who knew him well he was kind-hearted and always a gentleman. To a patient critically ill he was very attentive, and if he were not improving he would frequently weep at the bedside, feeling keenly his own responsibility and his inability to effect a cure. His friends respected and loved him, and in return his affection was most sincere and enduring.

He was French translator for several Canadian medical journals and these translations from foreign papers and from sporting and scientific journals for American periodicals kept the old gentleman busy. He read a great deal of medical and scientific literature. He was a diligent worker, often reading and working far into the night. I believe he found his most congenial work among his flowers, birds and reptiles. At his home he had a beautiful one-half acre plot of flowers, shrubs and grape-vines. He spent money lavishly in procuring from abroad plants for his

garden and was one of the earliest importers of bulbs into this country. As an ornithologist he was well known. He knew intimately nearly all our species of birds. McIllwraith, in his book, "Birds of Ontario", depended largely on Dr. Garnier for information on the birds of Western Ontario. He was well and favourably known at the Smithsonian Institute of Washington, D.C.

He always had his gun with him and was an excellent shot. Each year in the spring and autumn he visited the St. Clair flats for a few days' shooting, and many of the specimens obtained were brought home and preserved. When hunting he wore a special coat which was tight-fitting to the waist, where it spread out like a skirt, inside of which were sewn large pockets capable of holding as many as five turkeys.

In his garden he had sunken pools of water in which he kept reptiles for observation and study. He exchanged specimens with friends in various parts of the world. On one occasion he sent to the South Sea Islands for a reptile. When it arrived he was so chagrined to find it was not the one he wanted that he promptly returned it. He reported that this transaction cost him $400.00. It is known that on several occasions during his lifetime he was in receipt of large sums of money from Scotland. This money as well as the income from his medical practice was all spent in the interests of his beloved museum. His museum specimens were numerous enough to fill a room in the local school, as well as several rooms in his house. In 1890 he gave the Royal Ontario Museum a large collection of birds and reptiles. His records of this were destroyed by fire at the University afterward, though the specimens and labels escaped. In 1901, the remainder was purchased by the same museum and a brief tabulation shows that the collection was made up of about 600 birds, 160 mounted birds, 120 mammals, 125 skulls of mammals, 170 salamanders, 385 frogs and toads, 400 harmless snakes, 140 poisonous snakes, and 360 turtles, lizards, horned toads, alligators, etc. We can marvel at the industry of the man, for collecting and caring for a museum was a very arduous task in his day. He was very accurate in his cataloguing. In 1894, in the *Mail and Empire*, he published a list of 33 species of snakes found in Ontario. This list is still authoritative for Ontario for that period.

In a letter in May, 1894, to a member of the Canadian Institute, he says in part "Around this section I stand alone as far as Natural History is concerned. No one to speak to nor join in any way to help about Natural History in regard to mammals, birds and reptiles, especially the latter." He laboured largely without the inspiration of having co-workers. I think Dr. Garnier must have had something in common with the great Hunter, because above all else he preferred research in his museum and laboratory, and next to that the search in the woods and fields for specimens for his museum. Dr. Kelly somewhere has written "I claim a man has a right to be just as superficial as he chooses to be in as many things as he cares to take an interest, so long as he does one thing well." Dr. Garnier excelled as a naturalist. He also was a writer of considerable ability. Two plays were published by him, entitled, "Prince Pedro" and "Morgan the Jew". I have been unable to obtain a copy of the latter. Another book, "The Mistakes of Moses," was in process of preparation at the time of his death. It was an essay in which he pointed out what he deemed to be the inaccuracies of the Bible. It was done after the manner of Robert Ingersoll's writings, though more philosophical. "Prince Pedro" is an historical drama of 180 pages, published in 1877, and dedicated to the Governor-General, Lord Dufferin. The plot is laid in Portugal at the time of the Moorish wars. It is quite readable and I think would hold the interest of most readers to the end.

Dr. Garnier was not a business man and suffered much loss financially from those who imposed upon him. He gave away everything he had, dying a poor man. His widow died this past spring in Lucknow. There were no children by his marriage. Dr. Will Stevenson, of London, waited on him during his last illness, and states that he made no complaint, either of life itself or the approach of death, but looked upon death as the natural ending. May I quote Dr. Stevenson's words concerning him? "He was a man whom I loved and worshipped, as I was intimately associated with him from the time I was a child of eight until I saw him pass into the Great Beyond, and during that time he treated me with the affection of a father, and I him with the affection of a son. I visited him as frequently as possible, and from him I learned all that I know of zoology, and I owe all my collection to his encouragement. If he had been justly understood by the public they would have esteemed him as highly as I did. The greatest thing I learned from him was the observation of small things, because in the differentiation of varieties in zoology much depends on the placing of a scale or feather."

I have tried here to picture a physician who in the strenuous pioneer days of Ontario did his professional work well, and found time to excel as a naturalist and to write several books. Though his peculiarities of manner and his deviations from the accepted standards of conduct would be frowned upon to-day, yet I feel sure we are the poorer for not having more men with such striking personalities.

The truth is though it be necessary for a man to know and learne all Sciences, neverthelesse the knowledge of naturall Philosophy ought to be most esteemed, as being no lesse useful then furnished with all admirable delights, the variety of these will be things setting forth to their best extension the invincible wisdom of the externall Creator.—Wm. Coles, in "Adam in Eden, or Nature's Paradise," 1657.

MEDICINE IN CANADA*

A REVIEW BY SIR ANDREW MACPHAIL

Montreal

This is the ninth volume in a series of primers on the history of medicine, edited by Dr. E. B. Krumbhaar. Those already issued are: The Beginnings in Egypt and Assyria; Medicine in the British Isles; Anatomy; Internal Medicine; Physiology; Italian Medicine; Medicine Among the American Indians; Physical Therapy. Seventeen additional volumes are in preparation, and others will be announced later.

This book by Dr. Howell is singular amongst Canadian "pioneers": it can be read. That species of composition is usually written in a state of ecstasy; but this is a book of criticism as well as of facts. The author believes that the truth may be told with laughter: *ridentem dicere verum quid vetat?* He employs as his method humour, which describes things as they are, pretending they are as they should be; and irony, which describes things as they should be, pretending that is how they are.

The history of medicine is merely a part of the general history of current life. The medicine in those days was pioneer; all Canadian life was pioneer too. History to Dr. Howell is not a theory but a pageant, and in a few strokes he indicates the economic and political background against which the procession moved. Nor does he forget that in all pageantry there is an element of the comic which he indicates by light touches of caricature. He does not accept the common estimate, that those pioneer physicians were strictly abstemious, that they were inspired only by altruistic motives, that they got out of bed good-humouredly, that they were beloved by their neighbours, deeply religious, and their skill very great. On the contrary, he illustrates by pertinent examples that many of them were coarse, callous, intemperate, and ignorant. They were recruited mainly from the army, where they had entered the profession as surgeons' mates, subject to the same discipline as the rank and file. The mate's appointment was by warrant; if by industry and training he achieved a commission, his knowledge would not be above the average of the European ignorance of the time.

The nineteenth century was well advanced before any formal teaching of medicine began, and Dr. Howell gives a swift and accurate picture of those medical schools which have since grown to great eminence. Nor does he disguise the fact that some of these schools had their origin in professional and personal rivalry, with an additional element of the querulous and the quarrelsome, all of which he insists has long since passed away. That is a fair example of the author's irony.

Dr. Howell has an instinct for the salient; he has read the documents with open eyes and a fresh mind; he misses nothing; he discovers hidden lights that illumine whole periods. Those who have no especial interest in medicine will find this book a fascinating guide to the early history of Canada.

A reader who is willing to accept the advice of a reviewer will begin with the text, or, better still, read any chapter at random; for, although the book is a coherent whole, each chapter is complete in itself. The obscure title; the editor's preface; the author's preface, especially the first paragraph; the table of contents and of illustrations, the pious dedication, happily relieved, however, by the aptness of the quotation, will discourage all but a hardy reader. The editor's preface is quite "different than" the author's text. The little book will entertain, instruct, and amuse.

* Medicine in Canada. William B. Howell, M.D., Anæsthetist-in-Charge, Royal Victoria Hospital. Clio Medica Series, No. 9. 137 pages, illustrated. Price $1.50. Paul B. Hoeber, New York, 1933.

Hospital Service Department Notes

Charlottetown gets a Unique New Hospital

Prince Edward Island can no longer be considered the home of traditional conservatism. The Prince Edward Island Hospital at Charlottetown has been rebuilt on a new site and in its construction many innovations and ideas have been introduced, which so far have been incorporated into but few hospitals. It is perhaps the most thoroughly insulated hospital in Canada, the walls containing ten inches of insulating material, the roof seven inches, and the windows are triple glazed; this is a most desirable feature in a northern climate and has permitted radical reductions in the heating plant. It has more acoustic treatment per patient than has any other hospital in the country. Moreover, by an ingenious system of tower skylights a much more compact form of building has been possible and excellent lighting and ventilation have been provided for inside space which hitherto had but limited use. Convertible rooms fitted with concealed curtains are provided. In keeping with the trend towards artificial illumination, the operating rooms are equipped with ordinary room windows and a new inexpensive system of shadowless lighting of the discrete type, with an anti-glare feature, has been installed. The instrument cabinet is between two operating rooms, opening into both by translucent glass doors. Electrically controlled air-conditioning

All communications intended for the Department of Hospital Service of the Canadian Medical Associa- Secretary, 184 College Street, Toronto.

units, communicating directly with the outside air, have been installed in many of the departments.

Despite the many innovations the actual cost was remarkably low. Depending upon the method of calculation, the cost per bed is between $1,800 and $2,500; other hospitals providing comparable features in an equally fire-resisting building have cost at least $4,000 per bed and frequently more. The cost of operation, in view of the materials used and the grouping of services should be proportionately low. The patient capacity is calculated at 140, although at present but 104 beds and the nursery cots will be utilized, the remainder being occupied by nurses and other help. For the many excellent features credit is due to the achitects, Messrs. Govan and Ferguson, and their associates, and to the building committee.

The Hospitals and Community Service

The opportunities which our general hospitals have to serve their respective communities beyond the immediate care of the acutely ill was emphasized by several speakers at the recent convention of the Hospital Association of Nova Scotia and Prince Edward Island at Antigonish, N.S., which convention, incidentally, was a highly successful one. Perhaps the most eloquent appeal was that made by the Rev. M. M. Coady, of St. Francis Xavier University, whose labours as Director of the Extension work being carried on in rural areas and among fisherfolk has given him an unusual opportunity to appreciate the need of a more general knowledge of health on the part of the public. Pointing out the unhygienic methods of living, the unbalanced diets, the unhealthy housing, and the tardiness in consulting medical care on the part of so many people, he urged that hospitals throw the full force of their trained personnel into the task of educating the general public on health topics. Apparently health conditions and health knowledge in isolated fishing communities are most deplorable. For instance many children grow out of infancy into childhood without ever tasting cows' or goats' milk; and this state of affairs applies to isolated communities in many other parts of Canada as well. A resolution supporting this suggestion was unanimously passed, and hospitals were urged to be prepared to supply on request nurses, doctors or lay speakers who could speak on or demonstrate various subjects of health interest before clubs or meetings, or at the request of governmental or voluntary agencies interested in health education.

In this connection, St. Martha's Hospital at Antigonish has already performed a great community service. A Hospital Aids organization has been built up which comprises some eighty branches, each an oasis for the dissemination of knowledge in that community. "Health Clubs" have been organized among the school children in the district and already some forty clubs with weekly meetings and daily health inspections have been formed. School certificates, county banners and personal membership in the Order of Distinguished Service in Health are eagerly competed for. Other hospitals assist their communities in various ways. Many of the larger hospitals have an extensive social service department for follow-up work and other assistance, and this is usually at the expense of the hospital. One comparatively small hospital, the Charlottetown Hospital, has developed a social service department with a Sister, one lay graduate and pupils in rotation, which provides nursing at home, follow-up visits for dressings and will even provide nursing services for a confinement in the home. The hospital will actually supply clean bed linen if required. Charges for this service, if any, are at the discretion of the nurse. Home hygiene is taught, old clothing is collected, cleaned and mended at the hospital and distributed by loaned car through this department. At Glace Bay where most of the patients are under a form of health insurance, the hospitals assist in the support of the local V.O.N. nurses who treat hospital subscribers at home. In some communities the district health nurse uses the hospital as her base. The medical staff at Lamonte, Alta., hold school clinics in various parts of the district, and the work of the Red Cross nurses who spend a great deal of time in their outpost hospitals in community work and community education is too well known to require description. Other equally fine examples could be quoted. However, many hospitals, particularly those in smaller centres, take very little part if any in direct extra-mural community service. This is unfortunate, for, while serious financial embarrassment may prove a serious handicap to any extended participation, there are nevertheless many avenues of service available to hospitals, with very little or no financial outlay, which have never been developed in so many of our communities.

Be always displeased at what thou art, if thou desirest to attain what thou art not: for where thou hast pleased thyself, there thou abidest. But if thou sayest I have enough, thou perishest: always add, always walk, always proceed; neither stand still, nor go back, nor deviate: he that standeth still proceedeth not; he goeth back that continueth not; he deviateth that revolteth; he goeth better that creepeth in his way than he that runneth out of his way.—St. Augustine.

Special Correspondence

The Edinburgh Letter

(From our own Correspondent)

I recently had the interesting experience of being present at a luncheon in London held to celebrate the "coming-of-age" of the National Health Insurance Act. Sir E. Hilton Young, the present Minister of Health, presided. Mr. Lloyd George was the principal guest. The other guests present included several previous Ministers of Health who had administered the scheme, former members of the Cabinet and members of Parliament, civil servants, and experts who were associated with the drafting and launching of the Act, including the Secretary of the Department of Health for Scotland. Amongst the members of the British Medical Association present were Sir Henry Brackenbury, Chairman of Council, Dr. Cox, late Medical Secretary, and Dr. Anderson, the present Medical Secretary of the Association. Sir Hilton Young paid a tribute to the courage and vision of Mr. Lloyd George in introducing the Act. He referred to the successful way in which the scheme had survived the trials of the War and the difficulties due to the unemployment problem, and stated that it was working with absolute smoothness and regularity. He emphasized the importance of safeguarding its actuarial solvency as an insurance scheme. In an interesting and reminiscent speech Mr. Lloyd George referred to the opposition which the Bill encountered on its introduction. He said it was a peculiar measure in one respect—there never was a measure more needed, and never a measure less wanted. In humorous vein he recalled the attitude of the medical profession when the Bill was introduced. He reminded his audience that the doctors were persuaded, and honestly persuaded, that they were faced with ruin, and stated that he had a great deal of sympathy with them as long as they believed that. It was the first time that the medical profession as a body had come into politics, and politics was a very heady wine; people required to get accustomed to it, and the doctors were not. He was now sure, however, that the doctors approved of the National Health Insurance scheme and would never return to the old club system. He was proud of the benefits that the Act had conferred upon millions of his fellow-countrymen by the co-operation of State-help and self-help and of the alleviation of the risks and sufferings of life which it had accomplished.

The many friends in Canada of Prof. D. P. D. Wilkie, Professor of Surgery in the University of Edinburgh, will be interested to hear that by an order of the Committee of the Privy Council he has been recently appointed a member of the Medical Research Council. Professor Wilkie was born in Kirriemuir and educated at Edinburgh Academy. He had a brilliant career at Edinburgh University where he graduated M.B., Ch.B. in 1904. He obtained the degree of M.D. in 1907, and the degree of Ch.M. in 1909, receiving a gold medal for his thesis. He became a Fellow of the Royal College of Surgeons, Edinburgh, in 1907, and a Fellow of the Royal College of Surgeons, England, in 1918. He was appointed to the Chair of Surgery in Edinburgh University in 1924.

At the summer graduation of Aberdeen University, the honorary degree of Doctor of Laws was conferred upon Dr. William James Mayo of the Mayo Clinic. The Principal, Sir George Adam Smith, called on the Promotor in Laws, Professor A. Mackenzie Stuart, to present Dr. Mayo for laureation. Professor Mackenzie Stuart said that the University of Aberdeen acclaimed a surgeon of international reputation. The ties between Aberdeen and the United States were numerous. It was interesting to remember that in 1765 the University trained certain physicians who subsequently helped to staff the Medical School in Philadelphia. They would renew that connection with American surgery and in this year of Dr. Mayo's jubilee would join with the medical schools of the world in paying their homage to one of the greatest surgeons of his time.

Former house physicians and house surgeons in the Royal Infirmary of Edinburgh will be interested to hear that on a recent afternoon a party of seventeen of the Residents travelled by air to Gleneagles where they played a round of golf, dined in the hotel, and returned to Edinburgh in the evening.

The Annual Meeting of the British Medical Association held recently in Dublin was a great success. The deliberations of the Representative Body were ably presided over by Dr. E. K. Le Fleming of Bournemouth. A large number of overseas representatives were present. Lord Dawson of Penn completed his term of office as President of the Association and initiated his successor, Dr. T. Gilman Moorhead, Regius Professor of Physic at Trinity College, Dublin. The Representative Body received with the greatest pleasure the message of goodwill sent by the Canadian Medical Association. The Annual Meeting of the British Medical Association next year will be held in Bournemouth.

Sir Robert Philip, of Edinburgh, presided at the Annual Conference of the National Association for the Prevention of Tuberculosis held in Cardiff in July. This Association consists not only of doctors but also of laymen, men and women, who are concerned with the stamping out of tuberculosis. In the course of his address Sir Robert Philip said that the family doctor should regard it as one of his primary

functions to determine carefully, by the application at successive intervals of one or other of the excellent and harmless tests at our disposal, the earliest evidence of infection. A line of inquiry which had proved its reliability and efficacy in raising a tubercle-free herd of cattle they could not afford to omit in relation to the far-reaching issues which concerned the human family. Dr. McGonigle, Medical Officer of Health for Stockton-on-Tees, uttered a warning regarding the danger of the indiscriminate re-housing of families living in poverty. In one of the districts under his supervision where a whole section of the population had been transferred to a new block of model dwellings it was found that the death rate had increased instead of diminishing. It had been shown almost beyond any shadow of doubt that this increased death rate was definitely correlated with a diminished expenditure on food consequent on the increase in rents (about 4s. 6d. per week) without any accompanying increase in the family income. To the dietitian it was of great interest to note that the economies had in general been made by the purchase of less, or poorer, food containing "first-class" protein, that is, protein of animal origin in meat and milk products. Dr. Picken, Medical Officer of Health for Cardiff, said that Dr. McGonigle's observations taken along with our general experience forced one to the conclusion that poverty which reduced resistance was more important than housing, which acted mainly by affecting the opportunities for transmission.

At the Degree Congregation of the University of Bristol held at the beginning of July, the Honorary Degree of LL.D. was conferred on Lord Dawson of Penn, President of the British Medical Association, and on Sir Norman Walker of Edinburgh, President of the General Medical Council.

R. W. CRAIG.

6 Drumsheugh Gardens, Edinburgh.

The London Letter

(From our own correspondent)

It has been a busy month in London and there is much to record of medical interest. In the first place there was the laying of the foundation stone, by H. M. the King, of the London University's new buildings, and while to the average medical student his own teaching hospital means more than the larger corporation to which he also belongs it will be less easy to forget the university when the new building is completed in Bloomsbury, just behind the British Museum and near many large medical institutions. To the post-graduate, whose interest in the new university must of necessity be coloured with regret that there was no such place in his day, more importance must be given to the laying of the foundation stone by the Chancellor of the Exchequer of the British Post-Graduate Medical School at Hammersmith. This is the first objective stage in the realization of the project which has been long enough in its embryo state. The close association of the London County Council, the University of London, and H. M. Government in the financial side of the scheme makes things much more possible than they were ten years ago. The hostel for the reception for visitors to our medical facilities has been established for some years, the reconstruction of the Hammersmith Hospital is proceeding, and now the necessary medical school is to be completed. The next step, for which there is a great body of expectation, is the establishment of the staff and some organization of the scheme of work in the new system. A third opening ceremony, probably of far-reaching importance to the future of surgery, also took place recently when the President of the Royal College of Surgeons, Sir Holburt Waring opened the Buckston Browne Surgical Research Farm. This is situated in Kent and adjoins the famous home of Charles Darwin (Down House). There are two buildings, one containing laboratories and one a residential hostel, to which, as Sir Arthur Keith pointed out, younger members or fellows of the College will be able to come for a week-end to discuss their ideas and plans for research.

Besides opening ceremonies there has been another group of activities in the last few weeks in the shape of congresses and annual gatherings. The Oxford Ophthalmological Congress has been discussing glaucoma and the part played by the ear in the causation of miner's nystagmus. The National Association for the Prevention of Tuberculosis met at Cardiff to discuss the rôle of infection and environment respectively in the production of tuberculosis. The recent researches in a selected area on Tyneside has clearly showed how poverty and overcrowding, especially in relation to the housing problem, could be statistically related to tuberculosis. A racial susceptibility, especially among the Irish had also been found. The International Society of Urology had just concluded its fifth triennal congress in London, at which the main discussions centred round tumours of the renal pelvis and ureteral pyelography by the descending route, and surgery of the neck of the bladder. Lastly, the third International Pædiatric Congress has been meeting in London, with nearly 400 delegates, under the presidency of Dr. G. F. Still. The main meetings dealt with allergy and with the prevention of milk-borne diseases, while eight sectional gatherings dealt with a large number of short communications. The Dublin meeting of the British Medical Association is just beginning as this letter is being prepared and its proceedings must be left over for next month.

Research activities of the past few weeks have included an important announcement on the influenza virus. The same team of workers at the same institute—the Farm Laboratories of the National Institute for Medical Research—has brought to a very successful conclusion recently the search for the virus of distemper and a means of protective inoculation has now found that the ferret can be infected with human influenza and the way is clear to a close study of the virus which they believe is the main cause of the disease. Another line of work of great importance was dealt with in the tenth annual report of the British Empire Cancer Campaign, where the efforts of Dr. Thomas Lumsden to produce an anti-cancer serum have at last resulted in the stage of a trial on human sufferers with a euglobulin concentrate of a serum prepared from animals. The report also gives such a satisfactory account of the treatment of carcinoma of the pharynx and adjacent regions by massive radiation that the discontinuance of the radium "bomb" last year seems more of a mystery than ever. However it is now announced that a five-gram "bomb" is to be loaned at once to a new body, representative of medicine and physical science, to be known as the "Radium Beam Therapy Research" and the new development will provide for co-ordinated work on the therapeutic and experimental sides. Lastly, must be recorded an interesting ceremony when the twenty-first birthday of the National Health Insurance Act (which came into force on July 15, 1912) was celebrated at a luncheon, at which the principal guest was Mr. Lloyd George, who greatly amused himself telling some of those present who had been his bitterest opponents how much he had enjoyed the fight all those years ago.

ALAN MONCRIEFF.

121 Harley St., London, W.1.

Letters, Notes and Queries

The Prevalence of Chilblains in Canada*

To the Editor:

I am compiling some data on chilblains and I have been referred to you for information as to whether or not this affliction is prevalent in Canada during the winter.

Sections of the United States are almost entirely free of it, especially in the populous cities and States where the winters are not severe or the snow deep or the housing and clothing conditions not deficient.

It occurs to me that in northern and northwestern Canada in the wide open, deep snow places that chilblains might be extremely prevalent.

Any information you can supply me or any suggestion you can make to obtain this information will be greatly appreciated.

H. P. JOHNSON.

82 South Gratiot Avenue,
Mt. Clemens, Mich.,
July 24, 1933.

* The Editor would be glad to hear from our readers in various parts of Canada in regard to this topic.

The Technique of Administering Magnesium Sulphate during Labour

To the Editor:

I wonder if you could forward me the technique used in the administration of magnesium sulphate and morphine during labour?

I have been reading of this method of painless labour in current lay literature and would be very pleased if you could give me this technique.

ANON.

Answer:

"When the first stage labour is well established one-quarter or one-sixth of a grain of morphine is given hypodermically, and a 2 c.c. ampoule of 50 per cent magnesium sulphate is given intramuscularly into the buttock. The morphine is seldom repeated but the magnesium sulphate may be repeated in one or two hours if necessary, and even a third ampoule may be given at a one or two hour interval. Labour may then be completed in the usual manner with inhalation anæsthetic or by Gwathmey's splendid method of rectal ether. We have not been entirely convinced that magnesium sulphate is as useful as its creators thought, and of late have turned to the barbiturates, especially nembutal, which we use to supplement morphine or heroin when indicated. Replies to a questionnaire sent to ten leading Toronto obstetricians asking for their experiences in relieving pain in labour also confirms our conviction on magnesium sulphate, for it apparently is very little used in Toronto. Also experimental work by Shackell and Blumenthal reported in the May-June *Current Researches in Anæsthesia and Analgesia* would indicate that there is actually no synergism between magnesium sulphate and ether. Their work goes on to show that the minimal effective content of magnesium in blood serum is 5 mgrm. per cent, whereas that following three injections of 2 c.c. of 50 per cent magnesium sulphate is only 3 mgrm. per cent. Their summary on the question of synergism between magnesium salts and ether, was:

1. No potentiation of analgesic action could be detected when magnesium bromide and ether-oil were administered per rectum.

2. A simple summation of anæsthetic actions, as well as of toxicities was obtained with regularity.

3. The narrow margin of safety seen with magnesium sulphate alone was preserved in its combinations with ether. In other words, the margin of safety for ether was narrowed by combination with magnesium sulphate.

4. The experiments reported here afford no evidence in support of the use of magnesium sulphate or other salt of magnesium as an adjunct to ether-oil anæsthesia."

H. A. LOWRIE.

St. Michael's Hospital,
Toronto, July 13, 1933.

The Surgeon's Responsibility

To the Editor:

I read with interest your editorial comment on the recent case of Marshall *vs.* Curry. I hope you will grant me space to briefly comment on the principle evolved from this case, and to outline the whole of the surgeon's responsibility as I see it with regard to consent for operation. The judgment in the case under discussion may be read by those interested in "Dominion Law Reports," of July 13, 1933, page 260.

The principle enunciated is as follows: "An action of trespass will not lie against a surgeon who, in the course of a surgical operation, removes, without his patient's consent, an organ which he reasonably believes should be removed in order to preserve the patient's life or health."

As I see it, the correct procedure for the surgeon to follow in order that he adequately protect himself from legal action is as follows.

1. He should equip himself professionally to a degree that commands the confidence of his confrères in his surgical ability.

2. When consulted by a patient suffering from a malady requiring surgical treatment it is his duty to explain in language easily understandable by the patient the nature of his malady and the operative measures he proposes to employ to correct it. He should carefully indicate the degree of seriousness of the operation, the hoped for beneficial effects, and also the possible unfavourable ones. It is most unwise to dogmatically promise definite results. Rather does the sympathetic exposition of the whole situation, the good side and the bad side as well, invite the confidence of the average patient.

3. Having completed this explanation the surgeon must then specifically ask the patient's permission to perform the operation proposed. This must be as specifically answered.

4. His next step is to put the following question and have it specifically answered: "If at operation I find any additional condition present which in my opinion is likely to interfere with your health or be dangerous to your life, do you give me permission to do whatever I consider advisable to correct this as far as in my power lies?" This covers the aspect of consent involved in the Marshal *vs.* Curry case.

5. The surgeon may now commit the substance of this interview to writing in a manner similar to that below and having read it aloud to the patient in the presence of a witness, should have it signed by the patient and the witness, place and date being also carefully noted.

This is the average case. What shall be his procedure in the atypical ones?

1. Where the patient is unconscious and cannot consent, and where to delay operation in the hope of consciousness returning would endanger the life and health of the patient the surgeon may operate as consent is here implied. He should, however, if humanly possible, secure one or more consultants who agree with him that an operation is necessary and the nature of it. Also if the nearest relative available can be secured and his consent obtained it strengthens the position of the surgeon.

2. Where the patient is a minor who refuses operation but whose parents consent and urge it. If the patient is a child the refusal is safely disregarded, but if he is within a year or two of the age of twenty-one, his objection must not be lightly disregarded. If of sound and disposing mind at the time of refusal the onus of obtaining consent should lie with the parents and without it the surgeon is not justified in proceeding.

3. Where a person has injured himself in an obvious attempt to commit suicide and refuses surgical interference, let us say to close a wound in his throat, bleeding profusely. It is primarily the duty of every physician to preserve life. Moreover his duty as a citizen is to endeavour to prevent crime and to maintain law and order. In such circumstances he may proceed contrary to the wishes of the patient to employ such measures as are necessary to preserve his life and health but no more. If time permits he should take these measures at the formal request of an officer of the law, but lack of this should not prevent him doing his obvious duty.

The surgeon must always remember that the law recognizes the rights of every sane man and woman to dispose of their bodies as they see fit, regardless of how absurd the desire of the person may be. To disregard this spells disaster for the surgeon. It is his duty to urge by all legitimate means the necessity for operation, but further he must not go.

For the benefit of surgeons and hospitals the form below is submitted as covering the desired points:

FORM OF CONSENT FOR OPERATION

I ..... of .....
name of patient residence

solemnly state as follows:

That I have had fully explained to me the nature of the operation to be performed on me

by Dr. ..... I understand its nature and scope, and its probable results, and hereby grant him permission to perform it. If, while performing the operation, Dr. ..... discovers any condition present detrimental to my health, I give him full permission to correct it by any means he considers suitable or fit.

Signed by me in the presence of a witness, at ..... in the County of ..... in the Province of ..... this..... day of ....., 1933.

.....
Patient

.....
Witness

Yours truly,

H. L. SCAMMELL.

Victoria General Hospital,
Halifax, N.S.,
Aug. 7, 1933.

Topics of Current Interest

The Early Diagnosis of Malignant Disease

Malignant disease usually starts in one spot, possibly in an individual cell, and in the early stages is painless. A painless tumour or swelling therefore should never be disregarded. Malignant disease may advance for a time without causing symptoms or any disturbances in normal functions. In view of the inherent nature of cancer to spread or to invade distant areas, the earlier the patient submits to proper treatment the greater are his chances of recovery. Sir Holburt Waring,[1] president of the Royal College of Surgeons, has recently listed again the methods of examination that are available to the physician for the diagnosis of early malignant disease. A tumour observed by the patient or friends should be examined at once by a competent clinician. The examination should comprise visual observation of the tumour and palpation to determine its consistency and connection with adjacent tissues. The clinician should determine whether the tumour is solid or fluid, the margins in relation to surrounding tissues should be determined, and the presence or absence of pain on manipulation should be noted. As most malignant tumours are opaque, the swelling should be transilluminated. After the local examination, the lymphatic glands that drain the affected area should be palpated. A solid enlargement of lymphatic glands may help to confirm the diagnosis of cancer. When a tumour is noted near one of the normal openings of the body it should be examined with the finger, or with the eyes through some special instrument such as the postnasal mirror or the rhinoscope to examine the nasal cavity, the œsophagoscope to examine the œsophagus, and the bronchoscope to examine the bronchi. The rectum and lower part of the colon can be examined through the tube of a sigmoidoscope, and the interior of the bladder with a cystoscope. When solid or liquid material can be obtained from a suspected lesion, it should be examined by the microscope. Sometimes particles of a cancer may be seen in the blood-stained discharge from the nipple. When a swelling is accessible it is not difficult to remove a portion for histological examination. The specimen should be taken at the junction of the normal tissue and the suspected tumour and should be cut at right angles to the surface. The risk in doing biopsy of spreading the tumour when it is malignant, the writer says, probably can be avoided by the use of a diathermy knife in detaching a small portion. A roentgen examination may give valuable aid, especially when there is a suspicion of cancer of the alimentary canal. The roentgenograms should be made and interpreted by an expert radiologist after a conference with the clinician. This method applies also to the investigation of suspected tumours of bone and some other tissues. Definite diagnosis frequently demands the services of a diagnostic "team," including a clinician, a radiologist, a pathologist and a surgeon. Too much reliance, however, is sometimes placed on the histological appearance of tissue removed at biopsy, and sometimes on the roentgen examination alone. According to Bennett,[2] roentgen examination will reveal cancer of the stomach in the early stages in nearly every case. The precision of such an examination has increased so rapidly that even many physicians are not aware of the exactitude with which diagnosis can be reached. The chemical examination in the diagnosis of cancer of the alimentary tract is important. Few cases will fail to give a positive test for blood in the stools or fail to reveal dependable evidence in a carefully made analysis of the stomach contents. There are now available quite accurate methods of examination and various tests that may be applied in the early diagnosis of cancer in various regions of the body. Gradually the public is becoming more and more aware of what scientific medicine has to offer in saving life when cancer threatens. When popular education has been developed to the utmost, many thousands more will consult their physicians early enough to permit control by the established methods now available.—*J. Am. M. Ass.*, 1933, **101**: 129.

1. Waring, Holburt, The Early Diagnosis of Malignant Disease, *Practitioner*, 1933, **130**: 113.

2. Bennett, T. T., The Early Diagnosis of Carcinoma of the Stomach, *Practitioner*, 1933, **130**: 141.

Carriers as a Cause of Puerperal Fever

As a contribution to the ever present problem of puerperal fever I wish to review ten years' experience in a small country hospital where one nurse only is employed. Under these conditions the work of one doctor and one nurse can be observed over a period of time, and the results present the problem in a different light from that obtained in the larger centres where greater numbers are involved.

During the first two years four nurses were employed, each staying six months: nothing abnormal developed among the maternity cases.

The third year a nurse was engaged and remained for three years. Under her régime trouble started, and her maternity cases consistently had elevated temperatures. The fever was usually only slight, 99° to 101°, starting as a rule about the eighth day and subsiding in the course of a week or ten days. Three cases were of a more severe type and were sick for a period of about two months, one developing a thrombophlebitis in the leg and a small pulmonary embolism. Fortunately, they all eventually recovered.

This nurse was followed by one who had taken a post-graduate course at the Rotunda Hospital, in Dublin, and during her stay, which lasted three years, we did not have a maternity case develop a temperature above 99°.

The nurse who followed stayed one year and her results were equally good.

When she left we engaged a nurse who, we later discovered, was suffering from Hodgkin's disease and had a history of antrum trouble. At once morbidity among maternity patients developed. Invariably the temperature on the third day would rise to 101° or 102° and gradually subside by the tenth or twelfth day. Towards the end of this nurse's stay she contracted a cold followed by acute antrum trouble, first on one side and then on the other. For two months she was never free of this condition and had a temperature ranging from 100° to 103°. During this period she was obliged to assist at three maternity cases. Each of these, on the evening of the third day, had a chill and the temperature rose to 105° in two, and to 106° in the third. Fortunately, they all recovered eventually.

I am well aware that many factors are involved and that no dogmatic conclusions should be drawn from such a small experience. I wish to suggest the necessity for further investigation of the possibility of carriers being a cause of puerperal fever. Just as there are innocent carriers of typhoid, diphtheria, etc., is it not possible that certain attendants on maternity cases are innocent carriers of pathogenic organisms which have a predilection for the tissues of the birth canal and puerperal uterus, resulting in maternal morbidity and infection, the course and severity of which depends on the virulence of the organism transmitted?

Are not the following prophylactic measures at least worthy of trial? No nurse should be allowed on the maternity wards until she has been examined and found free from foci of infection, especially in the sinuses, teeth and tonsils. Swabs should be taken and cultures made of the throat and nasopharynx, to prove the absence of pathogenic organisms.

A close check should be kept on the attendants on each case so that in the event of the patient's running a temperature, along with all the other investigations these attendants could be carefully re-examined, in an effort to find a carrier among the patient's contacts.—F. E. Coy, Invermere, B.C., in the *Bulletin of the Vancouver Med. Ass.*, 1933, **9**: 148.

The British Broadcasting Corporation on Medical Privilege

By means of lectures and mock trials the British Broadcasting Corporation is pursuing the laudable object of acquainting us with the law which every citizen is supposed to know. The latest item in the series of trials, broadcast under the title of "Consider your Verdict," consisted of the closing speeches and the judge's summing-up in imaginary proceedings against a medical practitioner. Listeners were invited to suppose that a doctor had been asked in the witness-box to answer questions in violation of professional confidence, and that, instead of refusing to answer, he had given false answers, thereby exposing himself to a prosecution for perjury. In so far as the dramatizing of this hypothesis gave publicity to the principle of medical secrecy, and in so far as it explained that the principle exists in the interests of the patients and is therefore for the public benefit, the mock trial was excellent. In so far as it suggested that doctors, instead of keeping their mouths shut, are ready to give false answers upon oath, it was less admirable.

The hypothetical doctor was supposed to have been asked two questions before the magistrates —had he treated a patient for drug-taking, and had he supplied the patient with dangerous drugs? To both these questions he answered "No." When charged with perjury he admitted that the answers were untrue, but, pleading that they were made in accordance with professional etiquette, he contended that they were not "wilfully" false within the meaning of the Perjury Act. Actually, of course, in real life no practitioner would have adopted so inept and so mistaken a line of conduct. He might or might not have declined to answer, according to his personal view of his professional duty. Thereupon the magistrates might or might not have taken serious notice of the refusal. They have not the powers of an assize court to commit a witness for contempt of court. The Summary Jurisdiction Acts enable magistrates to send a

witness to gaol for seven days if he refuses to answer proper questions "without offering any just excuse for such refusal." The witness might or might not successfully maintain that medical privilege was a just excuse. But none of these contingencies would give a jury a chance to answer the glib question "should a doctor tell?" The British Broadcasting Corporation, therefore, to bring the doctor's dilemma within the range of the "Consider your Verdict" series, had to drag in the exotic and improbable element of perjury.

The statement that we are all supposed to know the law is not quite accurate. The true legal maxim is that ignorance of the law excuses nobody. A few years ago a witness at the Wandsworth County Court gave yet another version with which many will sympathize. "I know," he said, "that ignorance is no excuse for the law." Whichever of these versions we may prefer, we shall all welcome the efforts of the British Broadcasting Corporation to instruct us. The medical profession, however, must mildly protest against the broadcasting of a suggestion that perjury is part of the professional duty of a doctor.—*The Lancet*, 1932, **2**: 1118.

American Students in Foreign Medical Schools

Congested conditions in the American medical schools, as we have recognized in this country, have led to the migration of students to European centres. Every year lately in the United States a number of students have been refused admission to the schools, the competitive selection being designed to bring the standard in medical training to a high level. The commonest reason for rejection of candidates has been their inadequate premedical education, but undoubtedly race and personality have played their part in the methods of choice. Certain of the rejected students, having betaken themselves to medical centres in Europe, have returned to America with qualifications which have enabled them to pursue their medical training in America without going through the preliminary portals, and this has been considered to lead to a lowering of the American standard, inasmuch as the recipients of these foreign degrees and diplomas have not received, in the opinion of their home authorities, the requisite cultural training. In this country the General Medical Council, dealing with the question from the British point of view, have not found the American immigrants of any high quality, and the unfortunate young men have, in a large measure, failed to obtain training on this side. Those who have made good their right of entry to our schools and have duly attained their qualifications have hitherto been able to return to America, and without further scrutiny complete their medical training at home. Now, however, the Federation of State Medical Boards sitting in Chicago has recommended the following:—

> That no American student matriculating in a European medical school subsequent to the academic year 1932-1933 will be admitted to any State medical licensing examination who does not, before beginning such medical study, secure from a State board of medical examiners or other competent State authority a certificate, endorsed by the Association of American Medical Colleges or the Council on Medical Education and Hospitals of the American Medical Association, showing that he has met the premedical educational requirements prescribed by the aforementioned association.

The position has evidently caused considerable anxiety in the United States. An article entitled "The Foreign Medical Graduate," published in the *Journal* of the Association of American Medical Colleges in March last, and written by Mr. Harold Rypins, secretary to the Board of Examiners to the State of New York, suggests that there has been already definite damage to the American ideals; and in the same issue Dr. Zapffe, secretary to the Association, says that the medical schools of America are unlikely to have a shortage of students, the conclusion being that from the numerical point of view there is no reason why the student who has migrated should receive any particular welcome. Among the small number of graduates and diplomates from the British medical schools it is gratifying to learn that the after-result of American examinations is good, but from many of those schools we have heard that during recent years the influx from America, now checked by financial depression, has constituted a difficult problem, and certainly it is one to which the General Medical Council has paid considerable attention. Under the new system it appears that no American student matriculating in a European medical school will be admitted to any State licensing examination unless he can obtain from the State board of medical examiners, or other competent authority, a certificate showing that he has met the premedical educational requirements prescribed by the Association of American Medical Colleges. Further, no student, whether American or European, will be admitted to any State licensing examination unless he can produce satisfactory evidence of premedical education of the prescribed standard, and of graduation from a European medical school after a medical course of at least four years. An interesting phase in the whole question is the action of the faculty of medicine at Basle, which has resolved to demand from American students, as a condition of matriculation, the degree of bachelor of science or bachelor of arts as well as a knowledge of the German language. Should the faculty so determine in a particular case, these students may be given credit for two half years of scientific studies; examinations in physics, chemistry, and biology passed in America may be recognized for this purpose if the marks obtained in each

subject are not less than "*satis bene.*" Reciprocity in the training of medical students, at any rate between countries of similar cultural standing, was wont to be warmly advocated by medical educationists, but we are clearly receding from this position.—*The Lancet,* 1933, **1**: 810.

Mencken and Medical Care

In the *American Mercury* for March, Mr. H. L. Mencken, who comments pungently on most of the world's affairs, makes public his analysis of the final report of the Committee on the Costs of Medical Care. Mr. Mencken first expresses concretely the major conclusions of the majority report; namely, that the right way to relieve people of the burden of medical care is to throw that burden on the taxpayers and to convert the doctors into public functionaries. He realizes that the increased cost of medical care has not meant increased income for the physician but that most of the money "has gone to the hospitals, and they have got it, not in the character of institutions for the care and cure of the sick, but in the character of luxurious hotels for the entertainment and flattery of the sick." He emphasizes also the desire to keep up with the Joneses as a part of the reason for the financial disaster associated with hospital bills and particularly in the field of obstetrics. As has been pointed out in these columns, a substantial part of the increased cost of medical service is due to new techniques in medical science. On this point Mr. Mencken says:

> Not a few of them call for expensive apparatus, and all of them call for kinds of skill that cannot be had for nothing. It is obviously far more costly to make a series of x-ray plates and cardiograms of the heart than it used to be to do the whole job with a stethoscope, or even with the naked ear, as was the custom when I was young. A Wassermann may not cost as much as a permanent wave, but it at least costs more than no Wassermann. And it is plainly more expensive to cut out a gangrenous appendix and nurse the patient back to health than it used to be to give him a dose of Glauber's salts and send for a clergyman.

Mr. Mencken realizes that the problem of the costs of medical care is merely a part of the difficult economic situation in which we find ourselves generally. He calls on physicians to oppose vigorously the attempts that are being made to socialize their profession and he stresses particularly the necessity for restoring the family doctor to the central place in medical practice. He is not convinced that the formation of groups around hospitals will tend toward this end. "The way to restore his old importance," he says, "is to restore his old functions, and that is certainly not going to be done by transferring even more of his patients to hospitals. While he ends with a tribute to our profession, he also realizes the tendency toward the exploitation of the physician by uplifters in general:

> I confess that it always irritates me to hear medical men denounced as prehensile, as is often done, not only by quacks, but also by persons who should know better. They are actually, with very few exceptions, fellows of a vast and innocent sentimentality. The great majority, indeed, might be described with perfect accuracy as easy marks. The men of no other profession are so facilely operated on by specialists in other people's duties. They walk into the arms of every new uplifter who happens down the road. My hope is that the report of the Committee on the Costs of Medical Care, with its bald proposals to reduce them to a kind of peonage, will at last awaken them to the fact that they also owe some duties to themselves, and that, with everything else equal, the more they regard those duties the better they will be able to serve their actual patients.
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> —*J. Am. M. Ass.*, 1933, **100**: 822.

Medico-Legal

Chiropractors and the Title "Doctor"

A case has been recently decided before Mr. Justice Martineau of the Superior Court of Quebec in which the comments of the judge are so clear and impressive as to deserve the attention of the medical profession generally. The action was a test case to determine the rights of chiropractors in the Province and according to Judge Martineau's decision the use of the term doctor of chiropractic" is a violation of the Medical Act of Quebec.

In notes accompanying his judgment Mr. Justice Martineau discusses at some length the reasons for his decision. These notes, translated, are here given at length in view of the importance of the action and the fact that it will be carried to appeal:

> "The object of the laws concerning the practice of medicine does not appear to me to be to create a monopoly in favour of doctors of medicine," His Lordship declared, "but to protect the public from persons who, without possessing the qualifications deemed necessary by the legislators, make a business of looking after the sick.
>
> These laws, then, must be interpreted as broadly as is necessary to give them full effect. The terms of the law are also as generous as possible. It follows from them, I believe, first, that no persons other than physicians, that is, doctors of medicine, can practice medicine; second, that to practise medicine is to make a business of caring for the sick by treatment of some kind; third, that consultations, advice, the administration of medicines, the use of physical or mechanical methods constitutes the treatment of ailments; fourth, that not only is it forbidden to practise medicine without being a physician, but it is also forbidden for a person to take (a) the title 'doctor', (b) any other title or name that would lead the public to believe him legally capable of practising medicine.
>
> The whole question, then, is to decide if, in describing himself as a 'doctor of chiropractic', the defendant violated the law.
>
> It must first be observed that the law, in forbidding the use of the title 'doctor', assumed that the word itself implies that the person using it may legally practise medicine, and that it is in this sense that the person uses it.
>
> It must then be asked, if the words 'of chiropractic', which the defendant used after the word 'doctor', still

gave the impression that he was authorized to practise medicine, that is to say, to treat illness, even though he did so by chiropractic methods. Taking into consideration that the defendant made a business of caring for the sick, that his announcement was manifestly intended to make that known to sick persons, I believe, very humbly, that the word 'doctor' in the announcement in question gave rise to the belief that he had a right to care for the sick and that it was in this sense and for this purpose that he used it.

But the defendant pleads that a chiropractor does not intend to practise medicine, that he does not practise it because his treatment is not recognized by doctors of medicine. The argument does not appear to me to be well founded. The law forbids all persons to care for the sick unless they are doctors of medicine, however excellent their remedies, the value of their methods, the breadth of their science. Well, the chiropractor cares for the sick, therefore he violates the law.

The defendant also says: 'The doctor must diagnose the ailment of his patients in order to treat them—diagnosis, it may be said, is the essence of practice. But the chiropractor does not diagnose, therefore he does not practise medicine.'

The chiropractor, it is true, does not diagnose for each of the clients on whom, or against whom—I do not know which word is more exact—he applies his methods, but the reason is that, according to him, the whole of humanity suffers from the same evil, that is, a displacement or deviation of the vertebræ, which is the cause of all maladies! The diagnosis of each one is already made.

Mention was also made of the opposition to vaccination, to the use of serums, etc., and to the injustice done to the sick deprived of any treatment that may be of value. I have no doubt that this part of the plea is addressed rather to the public than to the bench. For that reason I do not reply to it, and I leave it to the appreciation of the public.

The conclusion I reach is in conformity with the authorities cited by the plaintiff, notably the judgment of the Cour de Cassation (France), reported in Dalloz 1901, I., 529, under a law which is not as general as our own. It is contrary to the judgment rendered by the Appeal Court of Ontario (13 Ontario L.R. 501). It was, in substance, decided in this case that if a person treats patients by remedies or methods which the doctors condemn and will not use, he does not practise medicine illegally. As this judgment is based upon the opinion that the law of Ontario has for its principal object the protection of doctors in the exercise of their profession and not to protect the public, except incidentally, I cannot follow it."

Judgment was accordingly rendered condemning J. E. Lesage to pay the College of Physicians and Surgeons $200 and costs, or go to jail for 60 days.

St. Germain and Laurence were attorneys for the plaintiff, with L. E. Beaulieu, K.C., as counsel; the defendant was represented by R. L. Calder, K.C.

MORS LARVÆ SIMILIS: TREMOR HINC, NIHIL INDE MALIGNI

E'en as the mask, in front seen only, fills
The mind of children with a panic fear,
So Death by men is feared: yet, least of ills,
Alike of both the terrors disappear
When seen by Reason's light on every side.
And why fear Death ere we its nature know?
'Tis but a livid mask which, seen behind,
Hath terrors none, but balm for every woe,
Hope, peace, and comfort to the righteous mind;
Opening to realms more bright the portals wide.

—*Katz's Emblems*

Abstracts from Current Literature

Medicine

The Heart in Myxœdema. Electrocardiograms and Roentgen-Ray Measurements before and after Therapy. Lerman, J., Clark, R. J. and Means, J. H., *Ann. Int. Med.*, 1933, **6**: 1251.

The authors have carried on a systematic study of the heart in myxœdema for about three years, and record complete cardiac measurements as determined by teleoroentgenograms in 30 cases, electrocardiographic findings in 24 cases, and blood pressure changes in 27 cases, before and after treatment with thyroid gland substance. Care was taken to separate cases of simple low metabolic rate and true myxœdema, and in interpreting the teleoroentgenograms to rule out errors due to alterations in the height of the diaphragm. The authors state their conclusions as follows. "The heart is generally enlarged in myxœdema. After thyroid medication the size of the heart in most cases undergoes a progressive shrinkage, which reaches its maximum as a rule in three to six months. The amount of reduction in the size of the heart is proportional to the degree of cardiac enlargement. The failure of some patients to show cardiac change after thyroid medication may be explained on the basis of either longstanding hypertension or the fact that the heart is not enlarged before treatment. The blood pressure is often elevated above normal. With treatment there is a tendency for both the systolic and diastolic pressures to fall, particularly the latter. The most marked reductions in blood pressure occur in patients with hypertension.

The electrocardiogram is always abnormal. The most common abnormality is a flattening or inversion of the T-waves, particularly in Lead II. In addition, axis deviation and small P and Q-R-S complexes are common. On thyroid treatment many of the abnormalities disappear wholly or in part. The greatest return to normal occurs in those patients with the most marked shrinkage in the size of the heart.

'Myxœdema heart,' in the sense of cardiac enlargement which undergoes shrinkage on thyroid medication, is common; in the sense of Zondek and Fahr, *i.e.*, cardiac enlargement in association with congestive failure, it is rare. The heart changes are to be regarded as part of the picture of myxœdema, not as a separate cardiac entity. The patients with findings suggestive of cardiac failure usually have hypertension and arteriosclerosis. The change in the heart with thyroid treatment is probably due to increased muscle tonus and loss of interstitial œdema. In an occasional case the loss of pericardial fluid may account for this change."

H. GODFREY BIRD

The Rôle of Psychic Load in Recurrent Attacks of Gastroduodenal Ulcers. Einhorn, M., *New Eng. J. Med.*, 1933, **208**: 681.

Emotional disturbances have a tendency to affect the digestive tract. Kaufman has pointed out that psychic influences play a causative rôle in the development of ulcers. At first this condition is noted as a simple pylorospasm, associated with hyperacidity, which when prolonged, may finally produce an erosion and then an ulcer. Taylor is of the opinion that psychic wear and tear is apparently communicated to the digestive tract as a definite trauma, which probably finds pathological expression in the blood supply at the site of the ulcer; Fitz and Rogers and Hardt have shown that psychic influences are capable of interfering with the normal course of gastric rhythm. Monsarrat is of the opinion that the alteration of gastric rhythm is the primary morbid condition. The author thinks that psychic influences, such as anger, shock, emotion and business reverses, exert a causative rôle in the development of recurrent attacks. Psychic load represents 7 per cent of all these recurrences. Case histories of 7 patients are given in detail showing that attacks were precipitated psychic elements. Duodenal ulcers occur in individuals between 20 and 30 years of age, gastric ulcers between 40 and 50 years of age. As the years progress the attacks become more frequent.

In the author's study of factors influencing the production of recurrences of gastroduodenal ulcers "colds" were found to be the most important, being present in 57 per cent of all recurrences; the mild cold constituted the highest percentage. Diet as a causative factor was found in only 9 per cent of the recurrent attacks. External pressure was the cause of 3 per cent of the recurrences, psychic trauma the cause of 7 per cent of the recurrences.

If colds are the causative factor, all sources of focal infection should be removed; if diet is the disturbing factor a suitable diet should be prescribed. All harmful psychic influences should be eradicated. The importance of visiting the physician in the spring and fall, to prevent recurrences, should also be stressed.

LILLIAN A. CHASE

Myotonia Congenita and Myotonia Atrophica in Two Brothers. Boe, G., *Acta med. Scand.*, 1932, **50**: 128.

This interesting disease, sometimes known as Thomsen's disease, is described as affecting 2 brothers, 3 of the 6 sons and 2 of the 6 daughters of 1 of these men, and 2 sons and 1 daughter of the 9 children of an affected man in the second generation. (Large families seem to be the rule in this pedigree). Thus in three generation 7 men and 3 women were affected. In the last generation one of the affected brothers also exhibited another rare disease, namely myotonia atrophica. Whether these are to be regarded as two distinct diseases, or as manifestations of the same underlying pathological condition it is hard to say. Many cases who show myotonia show no muscle atrophy, although the inability to relax the muscles, once they have been contracted, is an outstanding symptom of the myotonia atrophica complex. Again the very interesting association of cataract with myotonia atrophica calls for explanation which has not as yet been forthcoming. The finding of two very rare diseases in the same individual, both of which have myotonia as a conspicuous symptom, might lead to the assumption that one was merely an extension or accentuation of the other.

MADGE T. MACKLIN

Contribution to the Knowledge of Familial Hæmolytic Icterus in Sweden, with Particular Reference to Results of Operation. Beckman, T. M. and Jäderholm, K. B., *Acta chirurg. Scand.*, 1932, **59**: 353.

A family suffering from hæmolytic icterus or acholuric jaundice has been under observation in Sweden for a period of 20 years. The pedigree lists 96 persons, of whom 15 were affected. When one considers those who were normal and hence who could not transmit the defect, since this is one which behaves in this family as a true dominant, one finds that a large portion of the family were descended from normal parents. Those who came from affected stock number 24. Of these we find 15 affected. Thus the expectation of 50 per cent normal and 50 per cent affected when one parent is normal and the other affected with a dominant defect is practically fulfilled. There were 10 males and 5 females with the disease. Mothers and fathers transmitted it to children of both sexes. Fathers transmitted it three times, mothers twice.

The clinical symptoms were practically the same in all, jaundice, attacks of severe pain when the jaundice increased, enlarged liver and spleen. Fragility of the red blood cells was much increased in all. Splenectomy was performed in 6 cases, with no operative mortality, and with uniformly good results. Two of the operations were done at 10 and 12 years.

These writers point out that in their series, 2 cases of glandular tuberculosis were found at operation, and that subsequent to the operation, 7 others developed tuberculosis. They do not feel that these were chance infections, but were related directly to the removal of the spleen. They consider that there may be a protective function of the spleen which inhibits the development of the tuberculous lesion. The lymph glands have been found to show hyperplasia following splenectomy, and this has been interpreted by some to mean that the lymph

nodes have taken over the reticulo-endothelial activities of the spleen. These workers consider that this histological picture in the lymph nodes is one of very early glandular tuberculosis. The hæmolytic activities of the spleen are assumed by the liver.

The essential lesion in this disease is not the over-activity of the spleen in destroying the red blood cells, but lies in the defective formation of the red blood cells themselves, as shown by their microcytosis, anisocytosis and polychromasia, in addition to their increased fragility. Hence removal of the spleen, although helping to some extent, does not attack the fundamental cause of the disease, and therefore it is not to be wondered at that some of these abnormalities in the red blood cells persist, or that some of the patients exhibit relapses. In view of this possibility of a relapse, and of the unduly high percentage of tuberculosis cases that developed in their series after splenectomy, they urge caution in adopting this procedure unless it is absolutely necessary, although they point out that so far it constitutes the only method at our disposal for dealing with hæmolytic icterus.

In their series they found cases that were not sufficiently outspoken to have all the symptoms of the disease, but who on examination proved to be very mild cases of it. These various symptoms may be suppressed to a greater or lesser extent in some persons, and may even be suppressed to such an extent that the persons themselves may be free from the manifestations of the disease, although they still remain capable of transmitting it to their children.

MADGE T. MACKLIN

Surgery

Acute Obstruction of the Colon. Lockhart-Mummery, J. P., *Brit. M. J.*, 1933, **1**: 405.

Acute obstruction of the bowel is one of the most serious surgical emergencies. The patient suffers from (1) an obstruction to the lumen; (2) a toxæmia due to the absorption of poisons generated in the obstructed gut; and in some cases (3) the effects of obstruction of the blood supply to the affected bowel. The differentiation between small and large bowel obstruction should not be difficult. Seventy-five per cent of small bowel obstructions are due to external hernia. An examination of these sites should always be carried out, and if the cause lies here detection is easy. In small bowel obstruction symptoms are acute; fæcal vomiting occurs almost from the onset; pain is usually well-marked and often severe; and there is little distension in the early stages. Distension occurs in the central part of the abdomen. In large bowel obstruction distension is usually the chief symptom. Vomiting occurs late and is never so severe or so frequent as in small bowel obstruction.

Once the diagnosis of large bowel obstruction is made it is advisable to determine the probable nature and point of the obstruction. This is often difficult. The commonest cause of obstruction of the large bowel in people over middle age is cancer. Thus the probability of the lesion being cancer is 2 to 1. The next commonest cause is diverticulitis, which probably accounts for half of the remaining cases. Other conditions are appendiceal abscess, megacolon, adhesions and bands due to previous operations, hypertrophic tuberculosis, volvulus, stercolith, and submucous lipoma. This latter group probably accounts for 10 per cent of the cases. The commonest sites for cancer of the large bowel are the pelvic colon and rectum, next, the cæcum, and lastly the splenic flexure. The usual site for diverticulitis is the pelvic colon.

Immediate operation is called for in all cases. The chief dangers are vomiting while under the anæsthetic and toxic shock. The former may be obviated by washing the patient's stomach immediately before operation, or by doing the operation under some form of local anæsthesia; prevention of the latter is more difficult. The administration of large quantities of water or saline is important; glucose should also be given; all by the most convenient route. In bad cases these can be given subcutaneously or intravenously. Operation should aim at relieving the obstruction. The best is a blind cæcostomy or colostomy under local anæsthesia. Volvulus would not be benefited by such a procedure, but as it accounts for about 1 per cent of cases, and is usually fatal, it can be discounted. Subsequent treatment should aim at getting rid of toxæmia and relieving the over-loaded bowel.

STUART GORDON

Resected Knee Joints. Ghomley, R. N. and Brav, E. A., *Arch. Surg.*, 1933, **26**: 465.

Resection of the knee joint has been practised for many years at the Mayo Clinic. This operation makes it possible to secure a large enough specimen, so that a conception may be formed of the pathological changes in the joint. The authors review the records of 236 resection or fusion operations, and 9 amputations performed for disease of the knee-joint, in the years from 1919 to 1931 inclusive. Tuberculosis was found by microscopic study or by inoculation of guinea-pigs in 168 (68.6 per cent) of these cases, while in 66 cases (27.7 per cent), non-tuberculous inflammatory lesions were the cause of the destructive process, which included the end-results of septic joints, old traumatic joints, extensive proliferative arthritis, old osteomyelitis with involvement of the joints, atrophy due to anterior poliomyelitis. Most of the patients operated on were between the ages of 20 and 40 years.

There was a history of injury in 39.8 per cent of the tuberculous and in 39.4 per cent of the non-tuberculous patients. In 55.8 per cent of all cases the disease had existed more than five years prior to operation. The shortest duration of symptoms in the tuberculous cases was 3 months, and the longest 39 years, and in the non-tuberculous cases, 4 months and 33 years, respectively. Of the 120 gross specimens of the knee-joints obtained, it was found, on comparison between the specimens and the case histories, that the progress of the non-tuberculous types of infection, was more rapid than the tuberculous type as a rule. Early pannus formation is usually found in the tuberculous knee-joints with short duration of symptoms. There is usually no involvement of the cartilages. In non-tuberculous cases, advanced change in the joint structures, particularly the cartilaginous, is present, with some destruction of bone. In all of the tuberculous specimens there was involvement of both bone and of the synovial membrane. It was difficult to determine by x-ray examinations any constant diagnostic features in either the tuberculous or non-tuberculous knee-joints. Too much stress cannot be placed on the interpretation of the roentgenographic findings alone. The microscopical evidence as found in 91 tuberculous, in 15 non-tuberculous, and in 1 Charcot's joint, is outlined. The diagnosis of the two principal types of arthritis is frequently difficult and the tuberculin test is not a dependable measure. The inoculation of guinea-pigs in 12.5 per cent of the 24 cases proved incorrect. On the other hand microscopic examination of tissue removed at the time of operation was accurate in all but 3.2 per cent of the cases, an error of omission.

G. E. LEARMONTH

Obstetrics and Gynæcology

Diabetes and Pregnancy. Ronsheim, J., *Am. J. Obst. & Gyn.*, 1933, **25**: 710.

Three groups are considered; the diabetic who becomes pregnant, the pregnant woman who develops diabetes, and the pregnant woman who at no time shows evidence of diabetes, but in whom, after a catastrophe has beset the pregnancy, evidence of a latent diabetes is established by her responses to the sugar tolerance test. Up to the time of the introduction of insulin in the treatment of diabetes not more than 5 per cent of diabetic women became pregnant; since then this percentage has probably been raised. Maternal mortality before the days of insulin varied from 15 per cent to 30 per cent during pregnancy, labour, and the puerperium, with an additional 10 to 20 per cent dying within the year following of diabetes or tuberculosis. The effects upon the fetus are more severe. At least 50 per cent terminate in abortion, miscarriage or premature birth. If the patient escapes these complications fetal death *in utero* during the last few weeks of pregnancy is always to be considered. In addition, the deaths from prematurity, monstrosity and diabetes in early infancy raise this mortality to 65 per cent or more.

Latent diabetes is a greater menace to the fetus than frank diabetes. With proper treatment and cooperation on the part of the patient fetal mortality should be considerably reduced. Uncontrolled diabetes will almost invariably result in (a) miscarriage, premature birth of a live child who may or may not survive, (b) death of the fetus *in utero* a few weeks before term. Since the dangers to the unborn child are so great, Cæsarean section about three weeks before term must be seriously considered, particularly in primiparæ or where no previous pregnancy has resulted in a live birth. General anæsthesia, with ether or chloroform is to be avoided because of the danger of precipitating coma. The possibility of sloughing of the tissues from infiltration anæsthesia must be borne in mind. Repeated blood sugar determinations must be a part of routine prenatal care, since glycosuria may appear too late to prevent damage to the pregnancy. In cases of recurrent miscarriages or stillbirths without determinable cause, the sugar tolerance test may indicate that the patient is a potential diabetic. Determination of the sugar content of the amniotic fluid and of the fetal urine will help in establishing the diagnosis in some cases.

ROSS MITCHELL

Blood Sugar Findings in Eclampsia and Pre-eclampsia. Siegel, I. A. and Wylie, H. B., *Am. J. Obst. & Gyn.*, 1933, **26**: 29.

There is some disturbance in carbohydrate metabolism in eclampsia and preeclampsia, as evidenced by the changes in percentage of blood sugar. Fluctuations of blood sugar occur in eclampsia. Eclamptic convulsions are generally preceded by a fall in blood sugar, which is often one of "relative hypoclycæmia." Usually there is a temporary rise in blood sugar following a convulsion. After each succeeding convulsion there is an increasing tendency towards the establishment of lower blood sugar levels. Hyperglycæmia occurred in the majority of eclamptic patients studied in this series, although normal and hypoglycæmic values were found. In pre-eclampsia low normal or subnormal blood sugar is characteristic; as the patient improves under treatment or by delivery the blood sugar assumes more normal levels.

ROSS MITCHELL

Orthopædics

The Early Diagnosis of Malignant Disease of Bone. Brockman, E. P., *The Practitioner*, 1933, **130**: 199.

Primary malignant disease of bone is not a common condition. The diagnosis in some cases may be quite easy but at other times is extremely difficult. As a result of the investigations of Codman the nomenclature and classification has been considerably simplified, the most common malignant growth being osteogenic sarcoma. This must always be included in differential diagnosis. It is usually late when the patient presents himself for examination and the growth is quite often extensive. While it is possible to write down rules for the diagnosis of malignancy in bone, there are many exceptions. Osteogenic sarcoma usually grows rapidly and will enlarge from week to week; benign tumour usually grows much more slowly and inflammatory processes usually vary in size from day to day. The diagnosis depends principally on the clinical examination. The lower end of the femur and upper end of the tibia are the most common sites of osteogenic sarcoma (50 per cent in the lower end of the femur and 25 per cent in the upper end of the tibia). Other positions are uncommon. Tumours in the middle of a long bone are probably that rare condition known as Ewing's sarcoma, or a secondary growth. Palpation of the sarcoma yields a characteristic firm feeling which is not hard; chronic osteomyelitis usually feels harder. Tenderness does not occur until the late stage in sarcoma. The motion of the joint is less limited in sarcoma than in chronic osteomyelitis. Fever is never present except in the late stages of sarcoma. The x-ray is often disappointing, as we have been taught to expect the radiating spicules of bone. According to the records of the Sarcoma Registry only 18 per cent show this appearance.

It must be remembered that there are two distinct types of osteogenic sarcoma—one osteoblastic and the other osteolytic. In all cases a Wassermann test should be made, as gummatous osteitis may give similar x-ray findings. It is quite often that the pathologist is unable to aid in the diagnosis. If after careful clinical examination and careful x-ray the diagnosis is still in doubt, x-ray treatment should be tried as this tends to increase the formation of bone, although it does not cure the condition. X-ray has no influence on inflammatory conditions. Ewing's sarcoma is rarely diagnosed accurately, usually being treated as a chronic osteomyelitis. It attacks the middle of the long bone. There is usually history of attack of pain and swelling with a rise of temperature. The x-ray is characteristic, there being well-defined layers of bone under the periosteum-like layers of onion skin. X-ray can be used in differentiation, as it will produce a clean outline of bone in Ewing's tumour and has no effect in chronic osteomyelitis.

Secondary malignant growths are comparatively common, and, provided the primary growth is known, there is very little difficulty in the diagnosis, but where the primary growth is not known a very difficult problem is presented. The symptoms vary enormously. In many long bones their presence is not suspected until a pathological fracture occurs. In one situation, however, namely the body of the vertebræ the secondary growth reveals itself early because it gives rise to pain. This point is very important. The pain being persistent, rest effects no relief and the patient usually requires the assistance of drugs to relieve him. Any pain in the spine which is not relieved by rest should make one suspicious. Where secondary growth has caused a collapse of the vertebræ the x-ray is quite typical.

In tuberculous disease of the spine, which may be mistaken in older people for secondary growth, the pain is never so severe. Rest usually effects relief. Tuberculous disease usually involves more than one vertebræ, causing the development of a small kyphosis; also abscesses are usually present and the tuberculous spine shows crushing in the anterior portion of the body, rather than compression of the whole body, as occurs in malignant disease.

Charcot's arthropathy rarely occurs in the spine. It exhibits a kyphosis similar to that in tuberculosis of the spine, the early symptoms being ache and weakness. Pain is at times a prominent feature. The commonest secondary growth which gives rise to difficulty in diagnosis is a hypernephroma. This primary condition of the kidney is generally unsuspected and the patient seeks advice for symptoms which are rather indefinite. The situation of this type is often seen in the great trochanter and bones of the pelvis. Marked pulsation would appear to be a prominent feature of secondary hypernephroma. R. G. HUCKELL

Ophthalmology

Pathologic Changes in the Orbit in Progressive Exophthalmos: With Special Reference to Alterations in the Extra-Ocular Muscles and the Optic Disks. Naffziger, H. C., *Arch. Ophthal.*, 1933, **9**: 1.

The writer has seen a number of patients suffering from progressive exophthalmos following thyroidectomy, in each of whom careful study revealed many findings of ophthalmological interest. The usual development of the condition was as follows. Thyroidectomy was performed on a patient with exophthalmic goitre who presented the usual elevated basal metabolic rate, and cardio-vascular and nervous manifestations;

clinical improvement followed, except that the exophthalmos did not disappear. After three or four months it became evident that the proptosis was increasing. This was followed by fulness of the lids, with epiphora. A watery appearance of the scleral conjunctiva was followed by œdema near the inner canthus, and then by swelling which spread rapidly with protrusion of the inferior palpebral mucosa. Diplopia and lack of parallelism of the eyes were followed by an increased limitation of the movements of the globe, and downward movements were the only ones ultimately retained. During the increasing protrusion of the eye, the lids no longer completely covered the globe, and the cornea became exposed. Such patients were said to be suffering from malignant exophthalmos, and the severe cases progressed to the stage of corneal ulceration and infection. Many enucleations have been performed, but the usual termination has been an infected orbit, intracranial extension of the infection, and death.

The operation suggested consists in removal of the roofs of the orbit and optic foramen by an intra-cranial approach. The orbital fascia and the ring of Zinn are opened for purposes of decompression and to permit expansion of the contents of the orbit and the optic foramen. From the muscles in this series of cases, more than 20 specimens were removed for microscopical study. In each case, abnormalities were found in the extra-ocular muscles, which latter were increased in size from three to eight times.

In four of the six patients, the optic nerves and retina showed changes, most often swelling of the nerve head, hæmorrhage, and atrophy. In each of these treatment proved effective, If one investigates the reports on exophthalmos, and excludes those resulting from various tumours of the orbit, arterio-venous aneurysms, mucoceles, orbital affections, and the like, there still remains an enormous number, some in which the exophthalmos bears a relation to goitre, and others in which it is associated with cardio-vascular disease, cerebral hæmorrhage, and one of the chronic diseases, particularly syphilis and tuberculosis. There were no deaths in the series. The recession of the globes continued over many months, and varied from two to seven degrees on the exophthalmometer. In no cases has there been any tendency to recurrence. In each instance the globes show faint pulsation of which the patient is unaware.

S. HANFORD MCKEE

Neurology and Psychiatry

A New and Simplified Manometric Test for the Determination of Spinal Subarachnoid Block by the Inhalation of Amyl Nitrite. Elsberg, C. A. and Hare, C. C., *Bull. of Neurol. Inst. N. Y.*, 1932, **11**: 3.

Feeling dissatisfied with the manometric findings obtained by jugular compression, the authors have employed various substances in an endeavour to obtain a more standardized and sensitive method of investigating the patency or otherwise of the subarachnoid space. It was found that in patients with normal subarachnoid circulation, after inhalation of the ordinary amyl nitrite pearls for thirty seconds, an average total rise of 162 mm. occurred in 64 seconds, with a return to normal in 136 seconds; during the actual inhalation the rise averaged 94 mm. Based on a study of 63 cases of subarachnoid block (partial or complete) the authors found that in 5 cases of complete block by the amyl nitrite method, jugular compression showed a partial block in one, and very questionable results in another. In 5 cases of partial block to amyl nitrite, jugular compression gave a questionable result in one and entirely negative findings in three others. In every case where jugular compression revealed a block amyl nitrite also showed obliteration of the subarachnoid space.

Their conclusion is that, although the number of cases studied is as yet small, the inhalation of amyl nitrite is a sensitive and reliable means of investigating the condition of the subarachnoid space. Comparison of the records would strongly suggest that this method is both simpler and at the same time more delicate than manual jugular compression.

G. N. PATERSON-SMYTH

Familial Progressive Bulbar Paralysis. Lovell, H. W., *Arch. Neur. & Psych.*, 1932, **28**: 394.

Quite a number of cases have been reported of bulbar paralysis occurring in more than one member of the family, if one remembers that the disease itself is relatively rare. Lovell now adds another interesting group. He finds that in his family there was no evidence of the lateral tracts being involved, and so, strictly speaking, these could not be classed in with the amyotrophic lateral sclerosis group, although it is not uncommon for the disease process to affect not only the bulbar nuclei, but also the pyramidal tracts. It is of note that not only was the nervous lesion evident as an inherited factor in this family, but also the tendency to longevity, and to heart disease of some variety.

In the first generation, there was a father who lived to be 90 and died of some unstated type of heart trouble. The mother died at 37, cause unknown. This couple had five children, of whom the first and fourth, a son and daughter, respectively, died of bulbar paralysis at the age of 65. The third child was alive at 90; the second had died of heart trouble at 91; the last had died of heart trouble at 83. In the third generation there were two cases of bulbar paralysis, each one a child of an affected parent in the second generation. Thus the man who died of the disease at 65 had a son who suc-

cumbed to it at 55. The woman dying of it at 65, had 7 children. One daughter was suffering from bulbar paralysis at 66; two others in the family had died of other diseases. Four were alive at the ages of 58, 63, 68, and 70.

Although various types of therapy were tried, they were of no avail. Lovell states that the basis of this disease is an inherited medullary inferiority, which may not exhibit itself for years, but is nevertheless due to the constitution of the patient, MADGE T. MACKLIN

Dermatology

Psoriasis and Multiple Superficial Epithelioma. Wright, C. S. and Friedman, R. J., *Arch. Dermat. & Syphil.*, 1933, **27**: 70.

Multiple superficial epitheliomas have been recognized on this continent and in Europe for some years. The authors quote an accepted definition: "The condition is a peculiar form of epithelioma, usually of the basal-cell variety, but at times prickle-cell and, more rarely, of the mixed, basal and prickle-cell variety, of epithelial cell proliferation. It differs from other and better known forms of multiple epithelioma in that the lesions are essentially primary multiple formations which have their origin on normal skin; that is, they are not preceded by moles, warts, keratoses, arsenical keratodermas, or by any other so-called precancerous manifestations of the skin."

The literature is reviewed to illustrate the point that multiple epitheliomas develop, not infrequently, in persons suffering from psoriasis. Some of these develop on the psoriatic patches but others on the unaffected skin. Most patients who have had psoriasis for a long time have taken arsenic in one form or another. The authors report a series of five cases of multiple superficial epitheliomas. All of these patients had had psoriasis and three of them had taken arsenic. Of the three, none presented any arsenical hyperkeratoses or pigmentation and arsenic could not be demonstrated microchemically in the skin lesions. The authors wish to call attention to the fact that this type of epithelioma occurs fairly frequently with psoriasis. The importance of recognizing this new growth lies in the fact that the lesions are often overlooked or are regarded as part of the psoriatic eruption.

NORMAN M. WRONG

Ephedrine Dermatoses: Clinical and Experimental Study of a Personal Case, with a Review of the Literature. Abramowitz, E. W. and Noun, M. H., *Brit. J. Dermat. & Syphil.*, 1933, **45**: 225.

This is the tenth case of an eruption due to ephedrine which has been reported in the literature since 1929, but, as the authors suggest, many other cases have undoubtedly occurred. The author's case began to have twitching of the nose and prolonged fits of sneezing one week after commencing the use of ephedrine inhalant for nasal catarrh. The inhalant was continued and a few weeks later an eczematous eruption appeared first on her hand, then on her face, and finally on other parts of the body. Ten days after discontinuing the inhalant the eruption was considerably improved, but recurred when she used it as a spray for her baby's nose. When the patient's skin had returned to normal, patch tests were done with 1 per cent ephedrine in mineral oil and were carefully controlled by other patch tests on the patient and on her husband. The test for ephedrine was positive, but negative for the controls.

In reviewing the dermatoses due to ephedrine reported in the literature, the authors found that the drug may cause an eruption, whether taken by mouth or used as a spray. Patch tests were not uniformly positive. Ephetonin, a synthetic form of ephedrine, is less likely to cause an eruption than the natural product.

NORMAN M. WRONG

Hygiene and Public Health

Causes of Illness in 9,000 Families, Based on Nation-wide Periodic Canvasses, 1928-1931. Collins, S. D., *Public Health Reports*, 1933, **48**: 283.

In public health practice the measuring-rod that is usually used to determine progress is the death rate. This does not mean that the prevention of deaths is the primary objective in public health work, but rather that death rates are easier to secure than other possibly more important rates—sickness rates for example.

It is difficult to secure accurate records of sickness in a community or nation for various reasons. For one thing, the transition from health to sickness is so gradual that it is difficult to define the point at which an individual is definitely sick. Many cases of illness are not attended by a physician, and therefore the responsibility of reporting cases of sickness cannot be laid on the medical profession, and, finally, the difficulty of making it compulsory to register all cases of illness has to date proved insurmountable.

Broadly speaking there are two ways by which the amount of illness in a community may bet determined. (1) Many large industries keep an accurate record of loss of time from illness among their employees. These records are a valuable source of information. (2) Surveys may be conducted to determine by actual count the number of persons ill in a community. Some time ago the town of Hagerstown, Maryland, was surveyed over a period of time to determine the incidence of illness among the population. This town was thought to be representative of the American community so far as popula-

tion was concerned, but geographically, of course, it was only representative of the locality in which it was placed.

The survey here reported covers 18 states over a period of time averaging about 12 months. Some 9,000 families, representing about 39,000 person-years of life, were kept under observation. Each family was visited every two to four months and a record made of the illnesses suffered. The geographical distribution of the families would indicate that a very representative picture of the United States was probably secured, both urban and rural populations were included, the age distribution of the population surveyed was in reasonable accord with that of the population as a whole, and the economic status of the families corresponded fairly well with that of the country as recorded by the Federal census.

The outstanding cause of sickness was the respiratory group of diseases (colds, bronchitis, etc.); next in importance came the epidemic, endemic and infectious group. These two groups added together accounted for more than half the recorded disabilities. Actually, the annual case rate per 1,000 persons was 889.55.

Diseases of the circulatory system, which occupy the leading place in the mortality table, are relatively insignificant in the morbiditiy record. For example respiratory diseases caused 345.2 disabilities per 1,000 persons per year, while circulatory diseases caused only 21.4 disabilities. The number of days lost is not given and one cannot assess, therefore, the relative severity of the various diseases.

Although respiratory diseases, from the standpoint of numbers, were the most important, the Hagerstown study showed for them an even greater importance. The present study indicated a rate 345.2 per 1,000 persons per year, whereas the Hagerstown study showed a rate of 664. Apart from this, the Hagerstown figures correspond quite closely with the present study. It is thought that the Hagerstown study may have been disturbed somewhat by two moderate epidemics of influenza which occurred during the time the study was in progress.

Generally speaking the study illustrates the paradox that the diseases from which we suffer are not the diseases from which we die. It indicates, too, that some of the conditions which we stress in the medical curriculum are not the important conditions with which the practitioner has to deal. FRANK G. PEDLEY

Pathology and Experimental Medicine

Some Observations Concerning a Possible Insulin-Inhibiting Substance in Urine. Watson, E. M. and Dick, W. S., *Ann. Int. Med.*, 1932, **6**: 1171.

The authors refer to the work of Karelitz, Cohen, Leader and others, who observed that in rabbits the effect of insulin injected subcutaneously was considerably lessened if whole blood, blood plasma, or laked blood cells from a diabetic were simultaneously injected. In view of the frequency with which, at post-mortem, in spite of the most careful histological examination, the pancreas is found to be normal, there is some justification for supposing that an insulin-inhibiting substance may exist. Because blood, when heated, loses this power in inhibit the action of insulin, Karelitz and his colleagues believe that the inhibiting agent is probably enzyme-like in character, and they suggest that it may be trypsin. Trypsin, moreover, is known to inactivate insulin, and has been shown to cause glycogenolysis when introduced into the portal blood stream.

Watson and Dick, in an attempt to learn more of this insulin-inhibiting substance, conducted a series of experiments, using urine instead of blood. The urine was collected from diabetics and from non-diabetics, patients with infection being avoided, and urine containing protein, pus or blood being discarded. Urine from diabetics was obtained before the morning dose of insulin and about an hour and a half after voiding the night specimen. The authors found that the greatest inhibition to the action of the insulin was caused by diabetic urine, less by non-diabetic urine, and none at all was caused by the heated diabetic urine, as compared with the saline controls.

The authors discuss the possible nature of this insulin-inhibiting substance, but arrive at no conclusions as to its nature. They agree, however, that it is probably enzyme-like in character. H. GODFREY BIRD

Beitrag zur Kasuistik der Wirbelangiome mit Kompression des Rückenmarks. (Hämangiom des 7. Brustwirbels mit hochgradiger Aufblähung des Wirbelbogens.) A Contribution to the Study of Angioma of the Vertebra with Compression of the Spinal Cord. Sherer, E., *Beitr. z. pathol. Anat. u. z. allg. Pathol.*, 1933, **90**: 521.

The systematic post-mortem examination of the spinal column has shown hæmangiomata of the vertebræ to be relatively frequent. Because of their small size, however, they are completely symptomless, and are, therefore, unrecognized. Their frequency varies from 6 to 11.9 per cent, according to different authors. On the other hand, hæmangiomata of the vertebræ are described which, by compression, give the clinical picture of a transverse lesion of the cord. The author reports a case.

A woman, 59 years of age, had suffered from March, 1931, with pain in the trunk and weakness of the legs. She was admitted to hospital May 26, 1931, with complete paralysis and loss of sensation below the 10th dorsal segment. The x-ray showed marked changes in the 7th

dorsal vertebra, which were interpreted as due to an angioma. The vertebra was, on the whole considerably rarefied, but many of the vertical trabeculæ were greatly thickened, and stood out prominently. The whole vertebra was larger than normal, the normal concavity of the anterior, posterior, and lateral surfaces being lost, as if the vertebra were ballooned out.

At post-mortem, a mass of dark red granulation-like tissue filled the space from which the lamina and spinous process had been removed. When the cord was removed, a tumour 3 c.m. long was found protruding into the spinal canal from the right side of the arch of the seventh dorsal vertebra. It was hard, and covered with dura. It extended forward as far as the root of the arch, upwards to the articular process, and downwards to overlie the intervertebral foramen and the vertebral arch below. The body of the vertebra, together with the arch, the right transverse process, spinous process, base of left transverse process, and the right superior articular process, was infiltrated throughout by a soft dark red mass of tissue interspersed with yellow tissue. The spongy substance of the body was greatly rarefied, but contained many thickened vertical trabeculæ. The form of the vertebral body was preserved, except that it was slightly expanded. The intervertebral discs were normal. The medulla of the spinal cord at the point of greatest compression was reduced to one-half in thickness. The meninges were normal.

Microscopically, the cellular tissue of the marrow was found to be replaced by fat. Embedded in it were numerous thin-walled blood spaces, which varied markedly in size. Some were easily to be recognized by the naked eye, others were only three or four times as large as capillaries. Communications between the blood spaces and the fine capillaries of the fatty marrow, and between neighbouring blood spaces, occurred in great number. The walls of the blood spaces were extremely thin and consisted of flat endothelium lying directly against the fibrous structure of the fatty marrow. No elastic fibres were to be seen in their walls. They lay in absorption areas in the spongy substance which had come to consist mainly of coarse vertical trabeculæ. Osteoclasts were present in abundance. The cortex of the anterior, posterior, and lateral surfaces was in many places completely absorbed, so that the blood spaces came to lie directly beneath the periosteum. The superior and inferior surfaces of the body were likewise perforated, so that the marrow contents came into direct contact with the intervertebral cartilages. Sections of the vertebral arch and of the tumour in the spinal canal showed the same picture as the body of the vertebra.

New bone formation was seldom to be seen, and then only at the extremities of the vertical trabeculæ and beneath the periosteum covering the tumour tissue. It is believed, that, as the tumour extended, this fine, new-formed bony tissue became incorporated in it, to form the supporting framework, formation of a new cortex being repeatedly attempted. It is notable, that no solid cords of endothelial cells were found, nor any evidence of transition from mesenchymal to endothelial cells. The tumour is to be classed as an hamartoblastoma.

Twelve cases from the literature are cited. In these, the most frequent localization was the 6th dorsal vertebra. The subjects were mostly young women. When angiomata are found incidently in the routine examination of the spinal column, they occur usually in elderly people, and in the lower dorsal and lumbar vertebræ. The author suggests that when an angioma of the vertebra occurs in the upper dorsal region, some mechanical factor is responsible for its rapid and excessive growth, so that symptoms of pressure occur, and occur at a relatively early age. H. GODFREY BIRD

Experimental Production of Urinary Calculi. Higgins, C. C., *J. Urology*, 1933, **29**: 157.

The author in this symposium opens up probably the most important group of pathological conditions we have to treat, stone formation in the urinary tract. The introduction deals with statistics and previous experimental work which led up to the present investigation, and emphasizes that in countries where training in nutrition and hygiene has received attention, there is a marked reduction of the occurrence of vesical calculi in children. Experimentally he found that by feeding albino rats on a vitamine A-free diet, with balanced rations of carbohydrates and protein, and source of fat from olive oil, devitalized from any possible trace of the vitamine A, that between the 4th and 8th month 80 to 88 per cent of the rats developed bladder calculi; 30 to 40 per cent developed kidney calculi; and up to 23 per cent produced biliary calculi. Coincident with this factor he found was infection of the urinary passage — bladder infection occurring 1 to 2 months after the administration of the vitamine A-free diet, and kidney infection occurring in 2 to 3 months, but always associated with bladder infection. Xerophthalmia which occurred in 25 to 28 days was the first evidence of development of infection. In the early period of the study infection was not so frequent as calculi, but in a later stage calculi and infection occurred with about the same frequency. Streptococcus and mixed infection was found. The streptococci isolated from the bladder of these rats with calculi were tested in rabbits by injecting the culture into the pulp cavity of teeth, but failed to show any specificity, and by the intravenous route resulted in multiple pyæmic

abscesses and urinary infection, but no calculi. Alkalinuria was a constant finding in the rats with deficient vitamine A diet, this suggests the possible relationship of colloids, colloidal suspension and crystalloids in formation of urinary calculi. It is the author's impression that with deficient vitamine A diet; this suggests produced on a diet deficient in vitamine A the crystalloids are constantly increased in the urine to a point where the protective action of the true colloids is not sufficient and calculi begin to form. This mechanism combined with the infection of the genito-urinary tract usually present in animals having had a lack of vitamine A causes a rapid enlargement of the calculi. It is further of interest to note that by adding ammonium chloride to the food of rats being sustained on this diet the percentage of animals forming calculi decreased, and by addition of vitamine A to diet calculus formation was prevented. The calculi in every case were chiefly calcium phosphate with traces of carbonates and a small amount of mucoid substance.

V. J. BERRY

Therapeutics

Discussion on the Treatment of Anæmia. Witts, L. J., *Proc. Royal Soc. Med.*, 1933, **26**: 607.

The treatment of idiopathic microcytic anæmia is first considered. The forms of anæmia responding to iron are characterized by small size and pallor of the red cells, hypochromia which is due to deficient corpuscular content of iron, and by the fact that hæmoglobin is more constant than microcytosis. Such anæmias are: the anæmia of prematurity; chlorotic anæmias of later childhood; microcytic anæmias of later life; the anæmia of chronic hæmorrhage and in hookworm disease. Secondary anæmias occurring in other diseases respond to iron in so far as they are due to hæmoglobin deficiency; they do not respond in so far as they are due to toxæmia and depression of bone-marrow function.

The ferrous salts are the most potent preparations of iron, i.e., Blaud's pill (ferrous carbonate) and ferrous chloride (Ferronyl). Whereas 80 per cent of the microcytic anæmias can be cured by the administration of 100 mgrm. of ferrous iron a day, refractory cases require far greater amounts. Refractoriness may depend on the impaired absorption of iron from the alimentary tract; in some cases this might be due to atheroma of the mesenteric vessels.

The effective dose of iron by injection is of the same order of magnitude as the normal daily intake with the food. Indeed, it is only 32 mgrm. in the form of iron and ammonium citrate as against 16 mgrm. of iron present in the average normal dietary. Nevertheless, parenteral administration of iron is impracticable as a routine treatment owing to the pain caused by the injections and to the danger of iron poisoning. The expense is also considerably greater than that of giving much larger doses by the mouth.

The therapeutic action of iron in anæmia is due to the utilization of iron in the manufacture of hæmoglobin. In adult men and women there is no evidence that it acts by stimulation of the bone marrow or by virtue of contaminants of a catalytic nature, such as copper.

The idiopathic microcytic anæmia of adults is commonest in females, and towards the climacteric; menorrhagia may nullify the effects of treatment with iron. The author reports 10 cases of an average age of 43.7 years who did very well indeed after the induction of an artificial menopause (by hysterectomy, x-ray or radium).

The cost of the treatment of pernicious anæmia is then discussed. Dry extracts of liver are by far the most expensive treatment. Intramuscular injections of liver are the cheapest of all manufactured liver preparations and a little cheaper than fresh liver. They are the best treatment in emergencies. Stomach preparations vary enormously in price; the cheapest British preparation is cheaper than imported calf's liver and no dearer than ox liver. Desiccated hog's stomach is the best remedy for pernicious anæmia, the hæmoglobin being maintained at from 95 to 105 per cent by the administration of 1 oz. a day. The author usually begins treatment with a palatable liver extract or with intramuscular injections of liver and substitutes desiccated stomach as soon as the patient is out of danger.

W. FORD CONNELL

Discussion on the Treatment of Anæmia. Davidson, L. S. P., *Proc. Royal Soc. Med.*, 1933, **24**: 616.

A new classification of anæmias is proposed. "Primary" is to imply a virtual deficiency of one or other factors necessary for normal blood formation, despite the ingestion of an adequate dietary. There are four groups: (I) nutritional deficiency anæmias, (a) the deficiency being in the specific anti-anæmic material found in the liver, (b) there being deficient absorption or assimilation of the factors necessary for hæmoglobin formation; (II) post-hæmorrhagic anæmias; (III) hæmolytic anæmias; (IV) anæmias due to depression of bone-marrow function. The classification is intended to give information as to the etiology, the blood picture, and the treatment which might be expected to be of value. Pernicious anæmia in group I(a) is called "primary macrocytic hyperchromic anæmia" and simple achlorhydric anæmia; in group I(b) is "primary microcytic hypochromic anæmia."

Regarding the treatment of pernicious anæmia, it is suggested that many patients in the remission stage are suffering from a virtual iron deficiency, despite a high colour index.

The stores of iron which pile up in the relapse stage are all used up during the first month of treatment, and thereafter extra iron is required. The author suggests the administration of whole liver on three days a week as a method of making up this deficit. Iron may itself be used, especially if hypertension or nephritis be present.

A most potent extract of fish liver has been developed by the author at Aberdeen. It is equally as effective as mammalian liver extracts and costs about half as much.

The author considers the extrinsic factor to be some amino-acid or other substance of great value in blood-building, rather than vitamin B_2 as suggested by Strauss and Castle, since a vitamin can only act, in a nutritional sense, in infinitely small quantities. If it is believed that Marmite represents the final interaction product of the extrinsic and the intrinsic factor then every case should respond to it and any failures would have to be explained on the basis of insufficient dosage.

Regarding iron therapy, oral administration is undoubtedly the method of choice. Iron and ammonium citrate, 90 grains daily in a mixture, is the cheapest method. Blaud's pill, 60 grains daily, is also relatively cheap, while Ferronyl (ferrous chloride), gr. V-VII½ daily, costs about the same and is equally effective.

It is generally acepted that copper is necessary for normal blood formation. A well-balanced diet should contain at least 6 mgrm. of copper daily; one should insist that the patient eat plenty of animal protein and green vegetables. It is sound treatment to give ¼ lb. of liver daily, containing 1 mgrm. of copper, to severe cases of hypochromic anæmia, in addition to the usual iron therapy.

The author expressed the view that the impression that blood transfusion was a powerful stimulant of blood regeneration was probably incorrect. Its benefits are probably directly proportionate to the increase in the number of red cells and hæmoglobin passively introduced into the circulation. As a temporary and emergency measure it is still to be considered a life-saving procedure. W. FORD CONNELL

Discussion on the Treatment of Anæmia. Wilkinson, J. F., *Proc. Royal Soc. Med.*, 1933, **24**: 632.

The best treatment for pernicious anæmia is hog's stomach, provided that a reliable, active preparation is chosen; many commercial firms are still offering inactive products. In the past three and one-half years the author has treated 264 patients with pernicious anæmia with raw or desiccated hog's stomach alone, with no other form of treatment. They have done very well indeed; none have had relapses of their pernicious anæmia, though the majority are on maintenance doses of only 3½ to 7 grams daily of the preparation. The nervous changes due to cord involvement have responded better in the author's hands than in those cases treated with liver or iron.

The active stomach principle appears to be of an enzyme-like nature, for convenience termed "hæmopoietin." When it is appreciated that this hæmopoietin is a necessary gastric enzyme requiring a protein substrate before it can produce the active liver principle, it is clear that stomach should be more active than oral liver treatment, since the stomach tissue after the animal is killed also furnishes the required substrate.

In controlled series of cases of microcytic anæmia, the author obtained no better results with iron when combined with manganese, copper, or with both, than with iron alone.

W. FORD CONNELL

Congestive Heart Failure and Angina Pectoris. The Therapeutic Effect of Thyroidectomy on Patients without Clinical or Pathological Evidence of Thyroid Toxicity. Blumgart, H. L., Levine, S. A. and Berlin, D. D., *Arch. Int. Med.*, 1933, **51**: 866.

In previous studies on the velocity of the blood flow, the authors have shown that in patients with congestive heart failure and a normal basal metabolic rate, the basal velocity of blood flow is greatly slowed. They also showed that the blood flow may be similarly slowed in patients with the low metabolic rate of myxœdema, but such patients show no clinical symptoms or signs of congestive heart failure. Favourable effects of a reduction in the metabolic rate are seen in certain thyrotoxic patients with congestive heart failure whose circulation becomes compensated after subtotal thyroidectomy. With the above considerations in mind it occurred to the authors that persons with normal metabolism who suffer from congestive heart failure might show striking improvement if the metabolic rate were significantly lowered.

They report favourable clinical results by producing a subnormal metabolic rate by thyroidectomy in three patients who were suffering from severe congestive heart failure, but who showed no evidence of disturbed thyroid function, and in one patient with angina pectoris with a slight elevation of metabolism but with a normal thyroid gland. In two cases the improvement paralleled the lowered metabolism temporarily produced by sub-total thyroidectomy. In one patient with congestive heart failure, complete ablation of all thyroid tissue maintained his conspicuous clinical improvement and the basal metabolic rate has remained persistently lowered for more than six weeks. The patient with angina pectoris has shown no recurrence of the attacks since sub-total thyroidectomy, although he has returned to work and active life.

LEYLAND J. ADAMS

Obituaries

Dr. Edgar W. Allin, of Edmonton, Alta. To the members of the medical profession especially and to the citizens of Edmonton and surrounding country, among whom he has been so well known and universally loved and respected for many years, the sudden and unexpected death of Dr. Edgar W. Allin on July 15th, came as a great shock. Apparently in his usual state of health, he had performed four major operations in the morning and an emergency operation for appendicitis in the evening, after which he went driving in his car, collapsing at the wheel as he stopped in front of his brother's home. It may literally be stated that he died in harness, engaged to the last in the work he loved so well.

To few members of the medical profession has it been given to establish so many warm and intimate friendships as he among his confrères in practice, to whom he was at all times a jovial friend, hospitable and generous in the extreme. Recognized as one of the ablest surgeons in Canada, he was a never failing friend to all in need whether among his medical friends or the public generally. Quite regardless of the financial condition of the patient, he was always ready to respond, day or night, to calls from his professional friends in city or country, who desired his special ability in critical cases of surgery. It was often remarked by his confrères that he appeared to take, if possible, a greater pleasure in ministering to the poor and needy than to those more fortunate. The sudden termination of his activities as a surgeon at the age of 58, is a heavy loss to the medical profession in Edmonton, one and all of whom greatly deplore his passing.

The funeral was very largely attended on July 18th from McDougall United Church of which he was an honoured member. During his career in Edmonton he was a member of the Boards of St. Stephen's College and Alberta College and was Vice-president and Medical Referee of the Commercial Life Assurance Company of Canada, and to his ability and wise judgment as medical director much of the success of that young Company since its inception may be attributed. Apart from his devotion to his profession, he took a great interest in agriculture, owning a large farm near Edmonton, on which he specialized in raising poultry, thoroughbred live stock, and seed grain.

Born on September 14, 1875, on a farm near Bowmanville, Ont., Dr. Allin, son of the late Mr. and Mrs. Samuel Allin, matriculated from the Bowmanville High School, attended the Model School at Port Hope, after which he taught school for two years. He then went to Trinity Medical College Toronto, graduating with the degrees of M.D., C.M., in 1902, and the silver medal for general proficiency. Taking up post-graduate work in England he obtained the diploma of M.R.C.S. Eng. and L.R.C.P. London, in 1903. He then held appointments at the Royal United Hospital, Bath, and at the Prince of Wales Hospital in London for several years. Finally he returned to Canada, his native land, practising in Toronto for one year on the staff of the Orthopædic Hospital and in 1908 came to Edmonton where he has since resided. He was made a Fellow of the American College of Physicians and Surgeons and was honoured by being made a vice-president of that body in 1916. He was for one year president of the Edmonton Academy of Medicine and for a similar period of time president of the Alberta Medical Association.

Dr. Allin suffered a heavy blow in the double bereavement which came to him in May, 1932, when his wife and daughter, Leila, died within eight hours of each other. The surviving relatives are three daughters, Marjorie, Dorothy and Rosalind, and one son, Dr. Eardley Allin, now in England, who recently passed the primary examination for F.R.C.S. Eng. There are also five surviving brothers and one sister, Albert H., John E., Wesley R., S. E. Allin and Miss Annie Allin all of Bowmanville, Ontario, and Dr. Norman Allin, specialist in Eye, Ear, Nose and Throat, of Edmonton.

Many people in the community, including the writer of this article, to whom his valuable services have been rendered during the last quarter of a century will continue to remember with gratitude and appreciation the kindly friend and skilful surgeon who has passed on.

T. H. WHITELAW

Dr. Léo Blais died on July 10th at the age of 55. He was born at Lévis in 1878, studied at the school there and later took his medical course at the University of Laval, Quebec, where he graduated in 1904. He practised at Lac Mégantic for a great many years. He was one of the governors of the College of Physicians and Surgeons of the Province of Quebec.

Dr. Joseph Alfred Choquette, of Lewiston, Maine, died in Montreal at the age of 57 years. He pursued his studies at Bishop's College, Lennoxville, and at Laval University of Montreal receiving his diploma at the latter institution in 1902. He practised his profession between 1913 and 1929 in Montreal, when he returned to Lewiston. He was father of the well known Canadian poet, Robert Choquette.

Dr. James Henry Cully, of Pembroke, Ont., died at his home on July 19, 1933, after a lingering illness. Born in Pembroke thirty-seven years ago, the son of Mr. and Mrs. John T. Cully, the late Dr. Cully received his education at Pembroke Separate School, the Pembroke Collegiate Institute and McGill University, from which institution he graduated in medicine in 1921.

Dr. Eugene Decarreaux, of Saint-Augustin, Que., died on August 8, 1933. He was in his 58th year. He had practised for more than thirty years in Saint-Augustin. He was a graduate of Laval University (1901).

Dr. J. -Odion Drouin, of St. Alexis de Grande-Baie, Que., died suddenly on July 29, 1933. He was 58 years old. He received his degree at Laval University in 1900.

Dr. Edward G. Gillis died suddenly at his home in Kensington, Prince Edward Island, August 7th, at the age of 57 years. He had been in poor health for some months.

Dr. Gillis graduated from McGill University in 1899. He began his professional career in Kensington, and has remained in active practice there until his last illness.

Dr. Edmund James Johnstone, of Sydney, N.S., a general practitioner and port medical officer of Sydney, died on July 13, 1933, after a nine months' illness, in his 75th year. He was widely known in Masonry in the Maritimes, being a life-long member of the local Chapter, Royal Arch Masons and a Past Grand Master of the Grand Lodge of Nova Scotia, A.F. & A.M.

A native of Sydney, Dr. Johnstone studied at Dalhousie; Guy's Hospital, London; Bellevue Hospital, New York, and Edinburgh University, taking his M.D. degree from the Bellevue Hospital Medical School in 1882, and immediately took up practice in Sydney. He was superintendent of medical services for the British Empire Steel Corporation from the day of its inception and had an extensive private practice throughout the district.

Surviving him are his widow, formerly Caroline Kavanaugh, of Sydney; two sons, Edmund M. Johnstone, of the Bank of Montreal, Sydney, and Murray Johnstone, of Sydney; three daughters, Mrs. Harold Kayser, of Syracuse, N.Y.; Mrs. Carr Stewart, of Brockton, Mass., and Miss Helen Johnstone, at home; one sister, Miss L. B. Johnstone, of Halifax, and a brother, Dr. L. W. Johnstone, of Sydney Mines, M.P. for Cape Breton North.

Dr. Alfred E. Long, formerly of Tyne Valley, P.E.I., passed away on July 26th, in Vancouver, at the age of 84. The late Dr. Long was born in Fredericton, N.B., graduated at the University of New Brunswick, and later studied at Harvard. He retired from practice in 1912, and had lived quietly in Vancouver, since. A week before his demise, he and Mrs. Long celebrated their golden wedding.

Dr. George Cameron McGibbon, of Honeywood, Ont., died in the Allandale Hospital on July 27, 1933, in his 62nd year. Eldest son of Donald and Isabel Cameron McGibbon, he was born at Rock Glen, Lambton County, in 1871, and educated at the Arkona Public School, Parkhill High School and Ottawa Normal School. On graduating he taught school for five years, entering Trinity Medical College in 1895, and graduating with honours in 1899, after which he took up practice in Honeywood with Dr. Tufferd.

For thirty years Dr. McGibbon was medical health officer for the Township of Mulmur, County of Dufferin. He was secretary-treasurer of the public school, Honeywood, for many years. An eager student and reader, he established the first reading library in Honeywood, donating many books to the same. At the time of his death he was a member of the Ontario Historical Society.

A keen student in science, politics, medicine and history, he had amassed a large private library which contains some very rare volumes. He was a member of the Presbyterian Church, and in politics an ardent Conservative, being nominated several times both to the provincial and Federal houses. He was a life member of the Arkona Masonic Lodge, No. 307, a 32nd degree Scottish Rite Mason.

Dr. McGibbon was married twice. His first marriage was to Miss Maude Herbert, of Warwick, who predeceased him in 1908, leaving an infant son. His second marriage was to Miss Mary Helen McCullough, of Barrie, in 1924.

Dr. McGibbon was a member of a prominent and distinguished medical family, having five brothers as doctors; two sisters are nurses and one sister is married to a doctor. He is survived by his widow and young daughter, Isabel, at home, his son, Herbert, at Winnipeg; two brothers, Dr. Peter McGibbon, M.P., Bracebridge; Dr. Donald McGibbon, Los Angeles, and three sisters, Mrs. Blain, Hamilton, Mrs. James Detreville, New Orleans, and Mrs. McPherson, of Windsor.

Col. T. J. F. Murphy, of St. Johns, Que., died in Montreal on July 6, 1933. Col. Thomas Joseph Francis Murphy, D.S.O., M.D., (R.C.A.M.C., retired), was born in Arklow, County of Wicklow, Ireland, on December 21, 1864, the son of Dr. Martin Murphy, I.S.O., D.Sc., M.E.I.C. He received his early education at Rimouski College, and later was a student at Memramcook College. He also studied at Clongowes, Ireland, Dalhousie College, Halifax, N.S., and at the Bellevue Medical College, from which he graduated in 1888 with the degree of Doctor of Medicine.

He began his medical practice at Burgeo, Newfoundland, but three years later, in 1891, moved to New York where he remained until 1897. He then went to Halifax and was made visiting surgeon to the Victoria General Hospital there in 1900. In 1905 he was appointed captain in the permanent Army Medical Corps, stationed at Halifax. Five years later he was transferred to Quebec City. A year later he removed to St. Johns, Que., where he remained until 1915, when he joined the Canadian Expeditionary Force.

Dr. Murphy was second in command, and subsequently commanding officer of the Sixth Canadian Field Ambulance. In September, 1918, he was appointed A.D.M.S. of Witley Camp, and later of Bramshott. He returned to Canada late in 1919, first going to Saint John, N.B., and then to London, Ont. He retired on December 21, 1927, with the rank of colonel, and since that time had practised medicine at St. Johns, Que. Dr. Murphy was twice mentioned in despatches and was awarded the Distinguished Service Order, with bar.

A member of the Church of England, Dr. Murphy was rector's warden of St. James' Church, St. Johns, at the time of his death. In politics he was a Conservative.

Dr. Murphy married Miss Mary Silver Payne, of Moncton, N.B., in 1888, who survives, along with three sons, Martin Payne, and Thomas Payne, both of Montreal, and Arthur Payne, of Welland, Ont., and a daughter, Mollie Payne, wife of Dr. Albert Ross, of Montreal.

Dr. Albert A. Sharp died suddenly at his home in Bedeque, Prince Edward Island, August 7, at the age of 47. He was in apparent good health until ten days previous to death, when he developed symptoms of coronary thrombosis. Dr. Sharp graduated from McGill University 1916. He went overseas with the McGill General Hospital, later transferring to the Royal Army Medical Corps. During this period he was awarded the Military Cross.

After the War Dr. Sharp practised for a short time at Wellington, Prince Edward Island. He then moved to Central Bedeque, where he has remained during the past ten years. As physician and man, his ability, coupled with a kind and unassuming disposition, endeared him to both fellow practitioners and patients. His premature death will be a very real loss to the medical profession of Prince Edward Island. His many friends throughout Canada will join in our expression of sincere sympathy to his bereaved wife and family.

Dr. Edwin George Wood, died July 10, 1933, at Carmel, Calif., in his 73rd year. He was a graduate of McGill University (1885).

Dr. Thomas A. Wright, a highly esteemed citizen of Calgary, and for forty-four years a practitioner in western Canada died on July 28, 1933, in his seventy-first year. He was born in Renfrew County, Ontario, where he received his early education. He graduated from Queen's College, Kingston, in 1888, and in 1889 from Trinity College, Toronto. In 1889 he made his home in Russell, Manitoba, where for a number of years he was coroner, remaining there until 1911 when he came to Calgary where until a few months before his death he was in active practice. In politics he was an ardent Liberal and was a candidate for political honours at Russell in 1907.

Dr. Wright was for many years active in Masonic work and was a past master of Russell Lodge, Man., A.F. & A.M. and a member of Perfection Lodge, Calgary. He was an enthusiastic curler and for a number of years a member of the Calgary Curling Club. He leaves a wife and two daughters and three sons, Dr. Leslie Wright, of Hamilton, Ont., and Dr. Herbert W. Wright, of Calgary, both of whom are dentists and Dr. Victor W. Wright, a physician of Calgary.

News Items

Great Britain

Royal Empire Society.—At the Annual Empire Day Dinner of the Royal Empire Society, in reply to the toast to the workers in the Empire cause proposed by Sir Boyd Merriman, K.C., M.P., Lord Lloyd paid the following tribute to research workers in medical science.

"In the last fifty years has there not grown up a new category of Empire workers on whose work nearly all the work of every Empire-builder depends? I mean that hidden but devoted band of men engaged in medical and tropical research. Think of the young officer who goes out to a lonely post, sometimes with a young wife, who is there the prey of every foul disease—malaria, beri-beri, sleeping sickness, and so on—that we can imagine, who years ago lived in constant anxiety, and who to-day has at hand a practical assurance of immunity, with good fortune and luck, because of the work of these men. We remember the great work of the Wellcome Laboratories in Khartoum which have done so much for malaria. We think of another great college of medical research at Kuala Lumpur in the Malay States; we think of the fine work being done in Natal against bilharzia and in Queensland against dengue, but what everyone does not think of to-day, except the Colonial Secretary, who is doing so much for medical research all over the Empire, is that we need to strengthen more than ever before the band of tropical research workers because we have another fear, the swiftness of our communications. The swifter the communication, the greater the risk to the individual, because the deadly microbe, that in old days died on the way, can now in a few short hours be carried from Central Africa to some far distant country. If some day the communications get swifter, one trembles to think of what would happen if, for instance, yellow-jack penetrated the shores of India. In face of this great menace, I would like to say a word of thanks and encouragement to this splendid band of medical research workers, who rarely figure in the lists of Pro-Consuls and the rest, but who, none the less, give their lives and manhood in swamps and desert places to the greatest of all work."

Four Hundred and Ninety-seven Articles in a Man's Stomach.—The discovery of 497 articles, weighing together 3½ lbs., in a man's stomach was described to Mr. J. C. Bate, the West Cheshire Coroner, at an inquest on Thursday at the County Mental Hospital, Upton, near Chester, on the body of Frederick Vincent Edwards, 28, single, a farmer, of Wybunbury, near Nantwich. Edwards died in the hospital after an operation.

Prudence Margaret Edwards, a sister, identified a number of the articles discovered in her brother's stomach and which had been missed from the house.

Constable Couchman, who had compiled a list of the articles found in the man's stomach, said that they included:— 200 nails from half an inch to four and a half inches long; 36 staples, 43 gramophone needles; six teaspoons; three table forks; four pennies; two halfpennies; one shilling; six brace buckles; two links of beads; eight tea spoon handles; three door keys; one live revolver bullet; one brass tap key; three penknives; two "S" shaped meat hooks; ten safety pins; four sewing needles; six ordinary pins; six bolts; three nuts; one buttonhook; two metal guides from a spring bed mattress; one alarm clock key; four hooks from a dresser; one buckle plate; one motor-car tire valve; one tiepin; one gas lamp burner; two buttons; one watchkey; one rolled gold ring; one pebble stone; 13 pieces of glass and earthenware; four collar studs; five washers; nine screws; seven curtain rings; one bicycle valve; and 92 small miscellaneous articles which could not be described.

Dr. Hamilton Grills, the medical superintendent at the hospital, said that Edwards had a delusion that his stomach was too smooth. The operation was successful, and did not hasten his death but gave him a chance to live. Death was due to ulceration of the stomach and hæmorrhage. He (witness) was very surprised that a man could live with so many articles in his stomach.

The Coroner said that he did not believe that Edwards had any intent to end his life, but that he swallowed the articles because he was insane. He found that Edwards's death was due to the causes mentioned and to misadventure.—*The Weekly Times*, June 15, 1933.

In the Birthday Honours List, issued by command of His Majesty on June 3rd, the following well known members of the profession were gazetted as Knights Bachelor:—

Arthur William Garrard Bagshawe, C.M.G., M.B., Director, Bureau of Hygiene and Tropical Diseases.

Raymond Henry Payne Crawfurd, M.D., F.R.C.P., consulting physician, King's College Hospital; Registrar of the Royal College of Physicians of London.

William Stewart Duke-Elder, M.D., D.Sc., F.R.C.S., Ophthalmic Surgeon, St. George's Hospital.

Robert McCarrison, C.I.E., Colonel I.M.S., K.H.P., M.D., F.R.C.P., Director, Nutritional Research, Indian Research Fund Association.

William Duke-Elder, ophthalmic surgeon to St. George's Hospital, was recently awarded the Nettleship gold medal and prize for the most valuable contribution to ophthalmology during the past three years, by the Ophthalmological Society of the United Kingdom. Dr. Arthur Bagshawe has been for many years Director of the Bureau of Hygiene and Tropical Diseases. Lastly, we mention with particular pleasure the knighthood for Colonel Robert McCarrison, I.M.S., director of Nutritional Research, Indian Research Fund Association, whose original and most valuable investigations on goitre and cretinism, and on deficiency diseases, have won him world-wide recognition.

Post-graduate Medicine.—Mr. Neville Chamberlain, Chancellor of the Exchequer, on July 17th laid the foundation-stone of the British Post-Graduate Medical School in Du Cane Road, W. The site of the new buildings adjoins that of the London County Council's Hammersmith Hospital. The school will work in association with the hospital, which is to be extended and improved by the London County Council to fit it more completely for its part in the scheme. Mr. Chamberlain said that this project of a post-graduate medical school was one that had long formed part of the dreams of thinkers on public health, and its final crystallization into a practical working scheme had only resulted from long and persistent effort.

At its meeting on June 30th, the senate of Glasgow University awarded to Professor D. F. Fraser-Harris the triennial prize (1932-33) in the History of Medicine for an essay on "Antiseptics before Lister."

The Order of St. John of Jerusalem.—The King has approved promotions in, and appointments to, the Venerable Order of the Hospital of St. John of Jerusalem, as follows:

Knight of Justice.—Lord Dawson of Penn, G.C.V.O., K.C.B., K.C.M.G., M.D., P.R.C.P.

Knight of Grace.—Major-General J. T. Fotheringham, C.M.G., M.D. (Toronto), Colonel Sir Edward N. Thornton, K.B.E., M.R.C.S. (Pretoria).

Alberta

Preparations are actively under way for the annual meeting of the Canadian Medical Association which will be held in Calgary in June, 1934. A committee has been formed which will make arrangements for the entertainment of guests to this foothills city, which should be interesting as well as unique. Situated as it is close to the Rocky Mountains, Calgary affords many sightseeing tours of unsurpassed scenic beauty. The Canadian Medical Association held the last annual meeting in Alberta at Edmonton in 1911, and it is expected that the 1934 meeting in Calgary will be quite as successful as the one held in Edmonton, which was largely attended.

The annual meeting of the Alberta Medical Association will be held in Calgary on September 12th, 13th and 14th, 1933. The representatives from the Canadian Medical Association this year will be, Profs. J. C. Meakins, of McGill University, Roscoe Graham, of Toronto University, and Dr. T. C. Routley, General Secretary of this Association. Public meetings will be held on the first day of the sessions at which the subjects of heart disease and of cancer will be discussed.

The expenditures for the month of June, 1933, for the Calgary Municipal Hospitals were $18,161.64, compared with $21,556.42 for June, 1932, while the revenue was $11,980.75 in June, 1933, and $13,500.53 for the same month last year. The cost to the mil-rate will be $6,180.89. In June, 1932, this was $8,055.89. During the first six months of 1933 the expenditures were $18,353.22 less than for the same period in 1932. Revenue was down $5,672.23 and the charge to the mil-rate decreased $12,680.99. Expenditures for the six months totalled $112,494.57. In the first six months of 1932 these were $130,847.79. The revenue was 70,353.17 compared with $76,025.70 last year. The charge to the mil-rate in 1932 was $54,822.00 for the half year while for this year it will be $42,141.10. Hospital days showed a slight decrease for this period, totalling 36,089, compared with 37,015 last year.

The collective days spent by Alberta patients in provincial hospitals totalled 803,175 in 1931. Of Alberta's 6,303 hospital beds, 1,193 are located in Calgary. Calgary has 17 different hospitals, both public and private, including orthopædic, pensions convalescent, isolation, maternity and tuberculosis institutions. There is one Indian hospital located at the Sarcee Reserve. Three local hospitals provide training courses for nurses. The Holy Cross Hospital in Calgary has accommodation for 300 patients, while the Royal Alexandra Hospital at Edmonton has 400 beds, and the University of Alberta Hospital in the same city has 360. The Calgary General, the Holy Cross, and the Grace Hospitals have accommodation combined for 528 patients. The Colonel Belcher Military Hospital has 175 beds; the Provincial Sanatorium at Keith, near Calgary, has 210; the two isolation hospitals 85; and the Red Cross Orthopædic Hospital, 85 beds.

The Provincial Government made no appropriation this year for the "travelling clinic" owing to the financial deficit connected with the operation of this clinic in past years. To meet the needs of the people, several members of the profession have made arrangements for tonsil clinics in various parts of the province and will cooperate with other local physicians. A reduction in fees has been made, which has proved to be satisfactory.

The members of the staff of the Calgary General Hospital recently proposed to the City Council that there should be an amalgamation of all city and school board health services into a single unit, which would be under the direction of the civic health department. Endorsation was also given to the stand taken by Dr. W. H. Hill, the Municipal Officer of Health, that the city's health activities should be confined to preventive medicine, that the civic "baby clinic" should confine its services to preventive and diagnostic fields, and that the practice of paying any member of the medical profession, whether specialists or otherwise, to carry on curative work in connection with this clinic, was contrary to the rules of preventive medicine. Remuneration of local physicians and surgeons for services rendered to the increasingly large numbers of indigent patients has been dealt with at several meetings of the Calgary Medical Society, and while certain recommendations were endorsed by the members, it is a known fact that neither the municipal, provincial or federal authorities are willing to shoulder any responsibility in this urgent matter. Sooner or later, cognizance will have to be taken of the requests of medical organizations in this western country, for relief from this load of responsibility in treating multitudes of patients, who through no fault of their own are destitute.

About thirty towns in various parts of the province will have been visited by the child welfare clinics of the Provincial Departments of Health when their work comes almost to completion about the latter part of July. Two districts will still remain to be visited during August, which will include thirteen towns adjacent to Medicine Hat and the Daysland-Killam area. Good results have followed the work already done, according to Dr. W. R. Bow, Deputy Minister of Health, and the attendance at all of the clinics has been large.

G. E. LEARMONTH

British Columbia

The Western Branch of the American Urological Association met in Vancouver from August 3rd to 5th, under the presidency of Dr. A. W. Hunter. Visitors included Dr. W. S. Pugh, of New York; Dr. Guy Hunter, of Johns Hopkins; Dr. H. C. Bumpus of the Mayo Foundation; and Drs. Casper and de la Pena, of San Francisco.

Through the courtesy of the Victor X-ray Corporation members of the Vancouver Medical Association were shown the Lahey film of the heart beat and electrocardiography, on July 25th.

On July 3rd, the British Columbia Medical Association formally ratified the new constitution, under which all its former activities, with the exception of scientific and educational work, will be taken over by the Council of the College of Physicians and Surgeons of the province. Dr. W. S. Turnbull was elected *President;* Dr. A. D. Lapp, of Tranquille, *Vice-president,* and Dr. Ethlyn Trapp, *Secretary-treasurer.*

The local branch of the Native Sons of British Columbia has for some years conferred annually a medal of good citizenship upon some esteemed citizen. This year Dr. R. E. McKechnie, and the medical profession, as well, were honoured in this way.

C. H. BASTIN

Manitoba

The report of the Sanatorium Board of Manitoba, just issued, shows that on December 31, 1932, 606 patients were in the various institutions which come within the scope of the Sanatorium Board, namely, the Manitoba Sanatorium at Ninette, St. Boniface Sanatorium in St. Vital, King George Hospital in Winnipeg, Central Tuberculosis Clinic, Winnipeg, and also in affiliated hospitals — Children's Hospital, Winnipeg General Hospital, and St. Boniface Hospital.

The travelling clinics covered a wider area in 1932 than ever before. Forty-seven separate clinics were held and 5,102 examinations made. In 269, or 5 per cent, of all examined tuberculosis was a new discovery, and in 77 of the new discoveries the disease was considered active and needing sanatorium treatment. In one neglected area with no resident doctor, visited for the first time, there were no fewer than 26 new discoveries, most of them with advanced and active disease. From this one district 16 were sent to the St. Boniface Sanatorium in one month. The past few years the cost of the travelling clinics has been borne by the sale of Christmas seals. There is a special van for personnel and equipment and a portable generator, so that clinics can be held quite independent of hydro or local electric currents. Practically all examined had x-ray film or films taken. The whole cost of these clinics, apart from the services of the public health nurse, was $2.27 per person examined in 1932, and $1.72 in 1931. In 1932 one in 78 of the non-urban population of Manitoba was examined by travelling clinics.

All the activities of both the Sanatorium at Ninette and the Central Tuberculosis Clinic were carried on efficiently and well with a reduction in cost per patient-day as compared with 1931 of more than 11 per cent. One of the special obstacles in Manitoba to the control and eradication of tuberculosis lies in the Indian population. Only British Columbia exceeds Manitoba in the proportion of Indian population.

The amount received for Christmas seals in 1932 was $7,207.88. When one considers the present equipment for fighting tuberculosis in Manitoba it is interesting to reflect that exactly 25 years ago Dr. Lawrason Brown, at the request of the Anti-Tuberculosis League, was in Manitoba for the purpose of investigating sites suitable for a sanatorium.

The *Winnipeg Free Press* of August 4th states that the number of families on relief, while less than in March of this year, is considerably greater than for the corresponding period a year ago. At present the only provision made by the City Council for the medical care of these people is through the services of one doctor who has other duties as well, and the City Health nurses, who, in many instances, have been required to diagnose the condition of the person to whom they were sent. The committee chosen by the Winnipeg Medical Society and the Manitoba Medical Association, after careful study of the situation and after a conference with the mayor and the Hospital Committee of the City Council, submitted in February, at the request of the City Hospital Committee, a plan somewhat similar to that obtaining in Ontario. So far no action has been taken by the City Council on this plan. Recently the City Council refused to receive a delegation from the unemployed who wished to lay before them the question of medical care. The Out-patient Clinic at the Winnipeg General Hospital has been closed since April 15th, and, after the City Council had taken no action on the plan submitted by the special relief committee of the Winnipeg Medical Society, the doctors of Greater Winnipeg agreed from July 1st not to attend people on relief except in cases of emergency. The definition of an "emergency" is quite a liberal one. At present the health of the city is remarkably good, but with the coming of winter the situation is likely to become acute.

In order to promote interest in the campaign against cancer and to provide funds the Cancer Research and Relief Institute of Manitoba has arranged for a Cancer Week during the middle of September. A tag day will be held in Winnipeg on September 16th, and in addition to this there will be a province-wide appeal. At least two-thirds of the patients who have received treatment within the past year through the Institute have been unable to pay, and of the remaining third many have been unable to pay more than a fraction of the whole cost.

The Annual Meeting of the Manitoba Medical Association will be held in the Fort Garry Hotel, Winnipeg, on September 7th, 8th and 9th. Visiting speakers will include Dr. Jonathan Meakins, Professor of Medicine, McGill University, Montreal, Dr. Roscoe Graham, of Toronto, and Dr. A. K. Haywood, of Vancouver. Local speakers will be Dr. J. L. Wiseman, Dr. John M. McEachern and Dr. W. F. Abbott, of Winnipeg, and others. The session on Saturday morning, September 9th, will be a joint meeting with the Canadian Hospital Association. Dr. A. M. Menzies will give his presidential address on September 7th.

ROSS MITCHELL

New Brunswick

Following the Canadian Medical Association meeting in Saint John, a considerable amount of detailed work remained in closing out contracts and accounts. When this work was more or less completed, the Saint John Medical Society convened for a dinner meeting held at the Bungalow. Dr. .G A. B. Addy, President of the Canadian Medical Association, and Dr. W. E. Rowley, Chairman of the Local Committee, took the opportunity of expressing their thanks to the members of the local Society for their assistance at the Canadian Medical Association meeting.

The main business of the meeting, however, was an eulogy presented to Dr. Stephen McDonald for his superlative efforts in providing entertainment for the visitors at the Canadian Medical Annual Meeting. This dinner was really a complimentary dinner to Dr. McDonald, whose services to the Saint John Medical Society and to the New Brunswick Medical Society have extended over a very long period of years. Dr. McDonald has held every office in the gift of the local society and of the New Brunswick Society, and is now Registrar of the College of Physicians and Surgeons of New Brunswick, a position which allows full field for his unusual talents. Preliminary remarks were offered by Dr. Joseph Tanzman, President of the Saint John Medical Society, followed by short addresses by Dr. Mayes Case and Dr. A. S. Kirkland. During the course of the evening, Dr. McDonald was the recipient of an illuminated address, conferring on him a fictitious degree from a fictitious college of entertainment.

The attendance included practically every member actively practising in Saint John.

A. STANLEY KIRKLAND

Nova Scotia

The provincial election to be held this months finds several medical men actively engaged. Eight members of the profession are contesting seats in the interests of some political party. Prominent among these are the Honourable G. H. Murphy, Minister of Public Health in the present Government, and Dr. A. MacD. Morton, who is also a member of the Legislature.

It is a pleasure to record the recovery, from a very serious illness, of Dr. W. G. Colwell who is associated with the Department of Obstetrics at Dalhousie. His friends will be glad to know that he will soon be able to be up and about again, and to indulge in his favourite pastime of golf.

Some of the recent graduates from Dalhousie University have returned to the province after spending some years in post-graduate work abroad, to engage in medical practice. Dr. Norman Coward and Dr. G. A. Winfield have settled in Halifax; Dr. Frank Hebb has gone to Liverpool, and Dr. A. G. MacLeod is practising in Dartmouth.

Dr. E. K. Marshall, Professor of Pharmacology at the Johns Hopkins University, paid a visit to Halifax during the first week of August. For the past few summers he has been conducting research on the renal function of fishes at Wood's Hole and latterly at Bar Harbor. Only recently he succeeded to the chair of Pharmacology on the retirement of Professor John J. Abel, having held the chair of Physiology for several years at the same institution.

There passed away in Sydney, Cape Breton, during July, Dr. E. J. Johnstone at the age of seventy-five years, after an illness of more than a year. During his life time he had taken an active interest in public activity while conducting a large medical practice.

The sudden death of Dr. Archibald MacMechan on August 8th removes one of the best known university figures in Canada. He was known to generations of medical graduates from Dalhousie University and they will mourn the passing of a great teacher. He retired from the chair of English Literature two years ago, and at the 1933 Convocation of Dalhousie University the degree of LL.D., *honoris causa*, was conferred upon him. He was also an LL.D. of Toronto. N. B. DREYER

Quebec

Dr. Daniel Longpré, Chief of Service at the Crèche d'Youville and Saint Luke's Hospital, Montreal, has just published a book entitled "L'Enfant Sain." This is the first book to appear in the French language here dealing with American hygienic methods and infant feeding. "L'Enfant Sain" is an elementary manual designed particularly for young physicians, nurses, and young mothers. The publisher is Albert Lévesque, 1735 St. Denis Street, Montreal, and the little volume of 130 pages costs only seventy-five cents.

Dr. Henri Marcoux has been appointed Professor of Biochemistry at Laval University, Quebec, in the room of Dr. Paulin who is returning to Europe. Dr. Marcoux studied medicine at Laval and was the first resident intern at the Saint-Sacrement Hospital. One year after graduation he went to Europe to study biochemistry under a government scholarship. On his return he was placed in charge of the laboratory at the Hôpital Laval.

Dr. Arthur Rousseau, Dean of the Faculty of Medicine, Laval University, has been elected president of the "Congrès des Médecins de Langue Française," which will assemble at Quebec on August 27, 1934, under the auspices of the "Association des Médecins de Langue Française de l'Amérique du Nord." Dr. Emile Sergent, of Paris, well known in Canada, is Joint-president.

The European and American Congresses, which have similar names, will meet in Quebec at the same time. Dr. Albert Paquet is president of the latter body. Drs. Emile Fortier, of Quebec, and Arloing, of Lyons, France, are the Joint-secretaries of the former. Dr. Joseph Vaillancourt will be the general secretary of the Congress. An interesting division of labours has been devised; the European Society will arrange for the Medical Section, while all other scientific questions will be left to the American one. Three important topics have been selected for discussion—hypoglycæmia, pancreatitis, and pyretotherapy (the artificial induction of fever). Already various committees are at work and substantial progress has been made. It is intended, at the same time, to celebrate the four hundredth anniversary of the voyage of Jacques Cartier to Gaspé. It is quite evident that the Congress of 1934 will be of the highest importance and interest and it is hoped that the attendance will be in accordance.

Drs. J. S. Henry, P. J. Kearns and N. W. Philpott, of Montreal, have been elected to Membership in the British College of Obstetricians and Gynæcologists.

The Medical Association of the Province of Quebec will hold a "Clinical Day" on September 5th and 6th, 1933, at Three Rivers.

The proceedings will begin with a dinner for the members of Council on September 5th, followed by a meeting of Council.

Cases will be presented and operations performed at the following institutions: St. Joseph's Hospital, the Normand and Cross Hospital and the Cooke Sanatorium. The following members of the profession are expected to take part: Doctors Beaudouin, Cross, Darche, Denoncourt, Dugre, Malone, H. Normand, M. J. Normand, Racicot and Tetreault. Visiting lecturers will address the gathering in both English and French.

The annual meeting of the members of the Medical Association of the Province of Quebec will take place at 1.30, Wednesday, September 6th, at which the annual reports will be read, a motion to amend the regulations so as to provide for a more adequate representation on the Council will be presented, and the officers for 1934 will be elected. At this session a discussion also will take place on "The Law of Public Relief."

Golf, bridge, afternoon teas, a dinner and a moonlight excursion round out the social side of the convention. A large attendance of the profession is hoped for.

United States

The International Assembly of the Inter-State Post-Graduate Medical Association of North America will be held in the Public Auditorium, Cleveland, Ohio, October 16 to 20, 1933. Many distinguished teachers and clinicians will appear on the program. A major list of the names of the contributors to the program, with other information, appears on page xxiii of this *Journal*. The registration fee of $5.00 admits all members of the profession in good standing.

General

The University Veterans League.—On May 31st a group of twelve university men, who had served overseas, met at dinner and afterwards in the Green Room at Hart House, and discussed the advisability of holding a re-union dinner of veterans of all Canadian universities or men who had served with university units. It seemed a propitious time, for it is now about fourteen years since the war ended. The idea of such a re-union emanated from George F. McKelvey, a graduate of Queen's University, who is at the present time President of the University of Toronto Overseas Company Club. His suggestion was quickly adopted, and evoked much enthusiasm from the members present. It was thought that the members attending such a re-union dinner might desire to form a permanent organization, and many plans were formulated as to what services such an organization could render to university men in particular, and the country in general. It was decided to concentrate on a re-union dinner and to leave all plans in abeyance, so that ambitious plans about future services that might be rendered by overseas university men would not collapse of their own weight. The new organization is called the "University Veterans' League."

At a subsequent meeting held in the Hart House on June 15th, which was attended by representatives of seven different universities, it was announced that Sir Arthur Currie, Principal of McGill University, and Canadian Corps Commander, had promised to attend the re-union dinner which it is proposed to hold at the Royal York Hotel on Armistice night, Saturday, November 11th next, following the Varsity-McGill rugby game, which takes place in Toronto on that date.

A number of applications for reservations for the dinner has already been received and from present indications, a very large turn-out is anticipated.

Enquiries as to dinner reservations or as to particulars relative to the organization should be directed to George F. McKelvey, Secretary of the organization, and Chairman of the Dinner and Convening Committee.

A number of committees, to complete the arrangements for the re-union dinner, have been appointed.

The French *Journal Officiel* has just published a decree affecting foreign doctors wishing to practise in France. Henceforth no one will be allowed to practise medicine in France who does not hold a French medical degree or who is not a French citizen or subject or a person belonging to a country under the protection of France. Citizens of countries in which French doctors are allowed to practise can apply for the benefit of diplomatic conventions which, in certain cases, enable French nationality to be dispensed with. There must, however, be no disparity in the number of doctors from any foreign country and the number of French doctors practising in that country. This decree applies also to dentists.

Nichols Prize.—In accordance with the will of the late Dr. Robert Thomas Nichols, the Royal Society of Medicine will offer, every three years, a prize (being the accumulated interest on £2,200), open to any British subject, for the most valuable contribution towards "The Discovery of the Causes and the Prevention of Death in Childbirth from Septicæmia."

Work submitted for the fourth award must reach the Secretary of the Society not later than October 1, 1933, and must be marked "Nichols Prize." It must be typewritten or printed in English, and accompanied by the name and address of the author.

Work already published may be submitted, provided that publication was not earlier than October 1, 1930.

If no work of sufficient merit be submitted, the prize will not be awarded.

Letters should be addressed to the Secretary of the Royal Society of Medicine, 1, Wimpole Street, London, W.1.

Book Reviews

Cardiovascular Pain as Biochemical Problem. Gordon Lambert, B.A., M.D., B.C., Senior Hon. Physician and Physician-in-Charge of Electrocardiographic Department, Royal Berkshire Hospital. 75 pages, illustrated. Price 6s. H. K. Lewis, London, 1933.

This is a short monograph on the subject of angina pectoris. The author for various reasons prefers to use the term "cardiovascular pain" rather than "angina pectoris."

The book is divided into four parts. First, an introduction, in which the relative merits of the "aortic pressure tambour" hypothesis and the "coronary ischæmia" theory are compared. The second part deals particularly with an anatomical, physiological and pathological study of the coronary circulation. Under this section is found a discussion of the relation of an inadequate blood supply to the heart to the production of cardiovascular pain. The claudication and cramp hypotheses are briefly discussed. The third section treats of the neural factor in cardiovascular pain. Here are presented the anatomical relations of the cardiac nerves. An interesting summary of pain distribution in angina pectoris and Head's theory of referred pain in visceral disease are included. The last ten pages are devoted to a discussion of the author's ideas of explaining the origin of angina pectoris on a biochemical basis. It is stated that not by anatomical lesions alone can the pain of angina pectoris be explained, but some other factor, a toxic factor, is essential to account for all forms of anginal pain. This toxic factor is as yet unknown. It is not necessarily produced in the myocardium, but may be carried in the general circulation from distant parts.

The book is very interesting and is a good summary of the literature upon, and the facts concerning, angina pectoris. Undoubtedly there is nothing new in the book which is not generally known about angina, except the statement of the problem—a biochemical one. Research along these lines apparently has not gone far enough to give us anything tangible. However, as stated before, for those interested it serves as an excellent and well-illustrated summary on the subject.

The Duodenum. Edward L. Kellogg, M.D., F.A.C.S., Professor of Surgery, N. Y. Polyclinic Medical School. 855 pages, illustrated. Price $10.00, Paul B. Hoeber, Inc., New York, 1933.

This monograph is well printed and profusely illustrated and covers all that is known and that has been written about the duodenum. The first chapter on the anatomy of the duodenum covers 37 pages and is one of the best chapters in the book, being well illustrated with photographs of anatomical specimens and frozen sections, as well as drawings showing the development of the duodenum and its relation to other organs.

The chapter on duodenal ulcer covers 130 pages and begins with some interesting historical notes. The vexed question of etiology is gone into very fully, but one notices that the most recent publications on the subject are not referred to.

Two of the best chapters are those dealing with x-ray diagnosis, and with parasites of the duodenum. The former, by Dr. A. Judson Quimby, Professor of Roentgenology at the New York Polyclinic, is an excellent collection of photographs of x-ray plates, with explanatory legend, which with the text covers 30 pages. The chapter on parasites, covering 50 pages, by Bailey K. Ashford, Professor of Tropical Diseases, University of Porto Rico, and Columbia University, N.Y., is of particular interest. This difficult subject is very completely covered and in such a clear and delightful manner as to make it not only very valuable for reference, but most interesting reading.

The book is a painstaking collection of all information on the duodenum and will be very valuable as a complete and easily accessible work of reference to all persons interested in this subject.

Gastric Anacidity, Its Relations to Disease. A. L. Bloomfield, M.D., Professor of Medicine, and W. S. Polland, Instructor in Medicine, Stanford University, San Francisco. 188 pages, illustrated. Price $3.00. Macmillan Co., New York and Toronto, 1933.

The authors admit a twofold purpose in writing this monograph—to collect under one cover recent important data bearing upon the subject, scattered widely throughout the literature, and secondly to correct a number of erroneous statements long handed down as fact. In these two aims the authors have succeeded eminently. They have in every case gone to original authorities and have marshalled the facts in such a way as to make a difficult subject appear much less involved than it really is. The authors are also to be congratulated upon their excellent critical review of certain recent observations bearing upon the relationship of gastric anacidity to anæmia, which have been generally accepted without adequate proof. The book is full of interesting information, is well illustrated by charts and graphs, and contains a complete bibliography on the subject in hand. It fills a gap long recognized in the literature on this subject.

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Neurological Effects of Syphilis—Diagnosis and Treatment. Bryan Buckley Sharp, M.D., M.R.C.P. (Lond.), Physician to Princess Beatrice Hospital. 92 pages, price $2.25. Oxford University Press, London; McAinsh & Co., Toronto, 1933.

In barely 92 pages the author discusses the most important questions of diagnosis and treatment of syphilis of the nervous system, including congenital neurosyphilis. With a freshness and directness of writing, and avoiding lengthy discussions, the author gives in seven short chapters a complete and full account of the latest accepted views on the subject adopted by the various schools. An excellent chapter is that which deals with the treatment of neurosyphilis. This is a well-balanced critical study of the various substances and methods employed to-day, especially pyrotherapy, and although the author does not record much of his personal experience, it is evident that he is well versed in his subject.

This little book, which should occupy a prominent place in the office of the practitioner and specialist, undoubtedly fills the need for a comprehensive account of this subject, and the author is to be congratulated upon its compilation.

Demonstrations of Physical Signs in Clinical Surgery. Hamilton Bailey, F.R.C.S., Surgeon, Royal Northern Hospital, London. Fourth ed., 287 pages, illustrated. Price $6.25. John Wright & Sons, Bristol; Macmillan Co., Toronto, 1933.

There is every reason for a favourable reception to this book. It is written by a man who is evidently a keen observer and an experienced teacher. The illustrations are from photographs taken for the most part by the author himself from cases under his own care, and every one of them is accurate and to the point. The text is written in a most attractive style. The descriptions are brief, but clearness is never sacrificed to brevity. When signs are ambiguous the use of x-ray or other laboratory aids is advocated or the reader is referred to special texts. Many references are made to actual cases and the text is often brightened by an apt allusion or a cleverly adapted quotation. Any experienced clinician may detect an occasional omission, but as a handbook for an advanced student or for a teacher of clinical surgery it is worth much more than its cost.

Intracranial Tumors. Percival Bailey, Professor of Surgery, University of Chicago. 475 pages, illustrated. Price $6.00. Charles C. Thomas, Springfield, Ill. and Baltimore, 1933.

The author of this text-book has had an extensive training in neurology. In 1926 he classified Dr. Cushing's collection of brain tumours, and with Dr. Cushing published "Tumours of the Glioma Group." Since that publication neuro-surgeons have been thinking in terms of pathology as well as localization, and Dr. Bailey's text-book has been written to emphasize and teach that the pathological nature of a tumour as well as its localization should be diagnosed before operation. The chapters on anatomy and physiology and the syndromes of various vascular lesions are satisfactory. The main body of the book consists of chapters on various pathological types of tumours, based on a typical case history. The problem of localization and interference of function of various parts of the brain is discussed with each pathological type of tumour. In this way an excellent attempt is made to show that a careful consideration of the history, age of the patient, and localization of the lesion enables one to make a correct pre-operative pathological diagnosis in most instances. He points out, however, that operation is almost always advised, even though the tumour is considered to be malignant and inoperable, as occasionally the lesion may prove to be innocent and amenable to surgical treatment.

Drawings of the microscopical preparations are used instead of photographs. If one is really interested in the microscopic picture a drawing is unsatisfactory without also seeing a photograph of the preparation from which the drawing was made. The annoyance of constantly having to turn to the back of the book to look up the author's name for a reference number could easily be remedied by having the name at the bottom of the page.

The chapter on treatment is brief but excellent and covers the important principles. The chapter on prognosis will be disappointing, the author rightly points out that mortality figures and survival periods alone mean little and that further knowledge as to the ability of patients to resume useful occupations is required, but no attempt is made to meet this need.

The book will be interesting, and useful to specialists in neurology. For students and practitioners the book is unsatisfactory; much more emphasis should be put upon physical examination and less space allotted to pathology. This is especially so because confidence can more readily be acquired in the art of a routine physical examination of the nervous system by study of a number of brain tumour cases than by any other means. If this art is acquired by the student and practitioner he need concern himself little with much that is in Bailey's book.

Human Values in Psychological Medicine. C. P. Blacker, M.C., M.A., M.D., M.R.C.P. 179 pages. Price $2.50. Oxford University Press, London; McAinsh & Co., Toronto, 1933.

Kraepelin revolutionized psychological medicine by the analysis and synthesis of clinical entities and by greatly advancing description and classification of syndromes. Another revolution, really initiated by Freud, is well under way. No longer satisfied with description and classification, the devotees of this rejuvenated lively branch of medicine are increasingly turning their attention to matters requiring even more subtle analysis. Their efforts, which give abundant promise of being of much greater practical value, are directed to the elucidation of the personal characteristics and idiosycrasies of individual sufferers.

To Dr. Blacker, such idiosyncrasies are to be found "in the realm of the person's affective reactions expressing themselves in the commerce of life as his values." His conception of value is not exactly that accepted by philosophers generally, but is a view modified in such a way that it will have practical importance for the medical psychologists, some of whom, by the way, very much dislike being called psychiatrists. The author is at great pains to delineate various conceptions of value and the portion of the book devoted to this purpose will appeal to but a limited section of the profession. The term "value" in so far as psychological medicine is concerned is applied to such objects, ideas, situations or occurrences as are pleasant, desired by and satisfying to the individual. And the object of the book is to show that the study of such values helps in the understanding of human diversity and is therefore needed in the direction and care of mental patients. Throughout one notes a gratifying attempt to correlate the views of physiology, biology and the "New Psychology." The views expressed are apparently based upon long clinical experience in which the investigator most painstakingly tried to elicit the "values" of a great many patients. The result is both interesting and illuminating to a degree that cannot be adequately represented in a short review. One cannot say that the book is as easy to read as some. The subject is a difficult one, and no one could make an easy-going story of it. Dr. Blacker's presentation bears the unmistakable signs of patient enquiry, honest informed thought, and careful statement. Those whose work lies in this field of medicine will find the book stimulating and helpful.

INTRAMUSCULAR USE OF LIVER EXTRACT

The administration of liver or of liver extracts has become a firmly established therapeutic measure which restores the blood picture to normal and improves the general condition of patients suffering from pernicious anaemia.

Sometimes, however, patients are too ill to take liver or liver extract by mouth. For such patients, or for any other case in which the physician considers parenteral injection to be desirable, the intramuscular use of liver extract is recommended.

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Prices and information relating to the use of Liver Extracts in the Treatment of Pernicious Anaemia will be supplied gladly upon request.

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BOOKS RECEIVED

International Health Year-Book, 1930. Vol. 6. Reports on Public Health Progress of Thirty-four Countries and Colonies in 1929. 1,100 pages. Price $6.00. League of Nations, Information Section, Room 197, Geneva.

Principles of Treatment of Muscles and Joints by Graduated Muscular Conditions. Morton Smart, C.V.O., D.S.O., M.D., Ch.B., Late Medical Officer in Charge of Electro-therapeutic Dept. Hospital for Sick Children, London. 217 pages. Price $4.50. Oxford University Press, London; McAinsh & Co., Toronto, 1933.

Physico-chemical Theory of the Process of Internal Defence of Animals. David Satya Anand, M.B., B.S., House Physician, Infectious Diseases Hospital, Lahore, India. 91 pages. Copies may be obtained from the author.

Medical Clinics of North America. Vol. 16. No. 5. Issued serially every other month. 300 pages, illustrated. Price $18.00 (6 numbers). W. B. Saunders, London and Philadelphia; McAinsh & Co., Toronto, March, 1933.

Theory and Practice of Massage and Medical Gymnastics. Beatrice M. Goodall-Copestake, Examiner to Chartered Society of Massage and Medical Gymnastics. Fifth edition, 332 pages, illustrated. Price 12/6d. H. K. Lewis, London, 1933.

One Hundred Popular Fallacies. Charles W. Budden, M.A., Ch.B., Vicar of St. Mildred's, Croydon. 162 pages. Price 3s. 6d. net. John Bale, Sons & Danielsson, London, 1932.

Criteria for Classification and Diagnosis of Heart Disease. By Criteria Committee of Heart Committee of N.Y. Tuberculosis and Health Association, Inc. Third edition, 131 pages. Price $1.00. American Heart Association, N.Y., 1932.

Pediatric Nursing. Abraham Levinson, B.S., M.D., Associate in Pediatrics, Northwestern University Medical School. Second edition, 282 pages, illustrated. Price $2.75. Lea & Febiger, Phila., 1933.

Significance of Phosphoric Esters in Metabolism. Robert Robison, Ph.D., D.Sc., F.R.S., Professor of Biochemistry, University of London. 104 pages, illustrated. Price $2.00. New York University Press, N.Y., 1932.

Synopsis of Public Health. E. W. Caryl Thomas, M.D., B.Sc., D.P.H., Barrister-at-Law, Medical Officer of Health, Dagenham. 646 pages. Price $6.25. John Wright & Sons, Bristol; Macmillan, Toronto, 1932.

International Clinics. Vol. 1, forty-third series. 305 pages, illustrated. Price $3.00. J. B. Lippincott, Philadelphia, Montreal and London, 1933.

Ten Years of Obstetrics and Gynecology in Private Practice. John L. Rothrock, A.B., M.D., F.A.C.S., Formerly Assoc. Prof. of Obstetrics and Gynecology, University of Minnesota. 209 pages, illustrated. Price $3.00. Paul B. Hoeber, New York, 1933.

Dynamics of Therapy in a Controlled Relationship. Jessie Taft, Philadelphia. 296 pages. Price $3.00. Macmillan Co., New York and Toronto, 1933.

Lippincott's Pocket Formulary. George E. Rehberger, M.D. Third ed. revised. Price $4.00. J. B. Lippincott, Philadelphia, London, and Montreal, 1933.

Aids to Dispensing. A. O. Bentley, Ph.C., Head of School of Pharmacy, University College, Nottingham. Second ed., 204 pages. Price $1.10. Baillière, Tindall & Cox, London; Macmillan Co., Toronto, 1933.

Light Therapy. Frank H. Krusen, M.D., Director, Dept. of Physical Medicine, Temple University, Philadelphia. 186 pages, illustrated. Price $3.50. Paul B. Hoeber, New York, 1933.

Synopsis of Surgery. Ernest W. H. Groves, M.S., M.D., B.Sc., F.R.C.S., Consulting Surgeon to Bristol General Hospital. Tenth ed., 693 pages, illustrated. Price $5.25. John Wright & Sons, Bristol; Macmillan Co., Toronto, 1933.

Excitability, a Cardiac Study. W. Burridge, D.M., M.A., Professor of Physiology, Lucknow University. 208 pages, illustrated. Price $4.75. Oxford University Press, London; McAinsh, Toronto, 1932.

Glasgow Royal Maternity and Women's Hospital. Medical Report for Year 1931. D. M. Hart, M.B., Ch.B., F.R.F.P.S., Registrar to the Hospital. 104 pages. Aird & Coghill, Glasgow, 1932.

American Men of Science. A Biographical Directory. Edited by J. McKeen Cattell and Jaques Cattell. Fifth ed., 1278 pages. Price $8.00. The Science Press, New York, 1933.

Diet in Sinus Infections and Colds. Egon V. Ullmann, M.D. Recipes and Menus by Elza Mez. 166 pages. Price $2.40. Macmillan Co., New York and Toronto, 1933.

Psychoanalysis and Medicine. A Study of the Wish to Fall Ill. Karin Stephen, M.A., M.R.C.S., L.R.C.P., sometime Fellow of Newnham College, Cambridge. 238 pages. Price $2.50. University Press, Cambridge; Macmillan Co., Toronto, 1933.

British Spas and Seaside Resorts. Official Handbook of the British Health Resorts Association. 196 pages, illustrated. Price 1s. net. J. & A. Churchill, London, 1933.

Treatment of Functional Nerve Cases by the Method of Neuro-induction. An essay by Leonard Inkster, M.A., M.R.C.S., Hon. Clinical Assistant of Tavistock Square Clinic. 73 pages. Price 3/6d. H. K. Lewis, London, 1933.

The Adjustment of Muscular Habits. Lt.-Col. James K. McConnel, D.S.O., M.C., Member of Chartered Society of Massage and Medical Gymnastics. 129 pages. Price 4/6d. H. K. Lewis, London, 1933.

International Clinics. Vol. 2, 43rd series. By various authors. 314 pages, illustrated. Price $3.00. J. B. Lippincott Co., Philadelphia, London and Montreal, 1933.

Le Nystagmus Vestibulaire et les Réactions de Mouvements. R. Claoué, Professeur libre d'Oto-rhino-laryngologie. 64 pages, illustrated. Published by Norbert Maloine, Paris, 1933.

Nervous Child at School. Hector Charles Cameron, M.A., M.D., F.R.C.P., Physician in charge of Children's Dept., Guy's Hospital. 160 pages. Price $2.00. Oxford University Press, London; McAinsh & Co., Toronto, 1933.

Food in Health and Disease. Katherine Mitchell Thoma, B.A., Director of Dietetics, Michael Reese Hospital, Chicago. 370 pages. Price $2.75. F. A. Davis Co., Philadelphia, 1933.